NEW YORK SEATTLE

MOTORSHIP

Devoted to Commercial and Naval Motor Vessels

"MOTORSHIP" is entered as second-class matter at the Post-office at New York, N. Y., U. S. A., July, 1918, under the Act of March 3rd, 1879.
Office of Publication, 1270 Broadway, New York, N. Y.

Issued Monthly
PRICE 25 CENTS
Domestic, $3.00 per year
Foreign, $3.50 per year

MAY, 1921
Vol. 6 No. 5

EXCLUSIVE motorship-operating and technical articles by the world's foremost writers on marine engineering appear in every issue.

MOTORSHIP

(Trade Mark Registered)

PROFUSELY illustrated with photographic reproductions of the newest designs in international merchant motorship construction.

Vol. VI | New York, U. S. A., May, 1921 | No. 5

New All-American 6,000 Tons d.w. Motorship "Kennecott"

McIntosh & Seymour Diesel-Powered Freighter Averages 11 Knots on Maiden Voyage Burning Regular Heavy Boiler-Oil

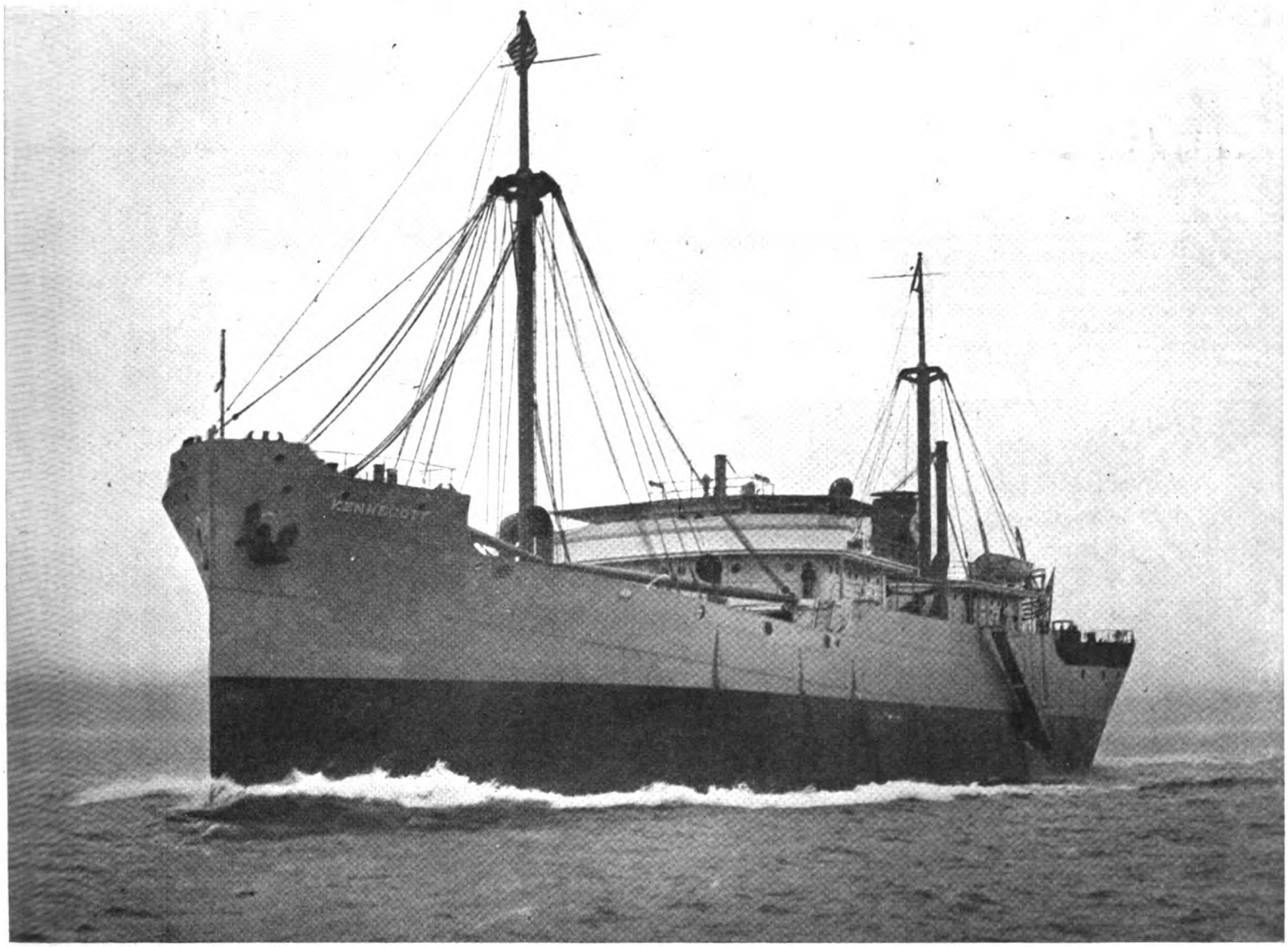
BY DANIEL L. PRATT.*

(*Editor of "Motorship's" Sister Journal, "Pacific Motor Boat.")

IN THE annals of Pacific Coast shipping, March 17th, 1921, was an important and a significant date, for it marked the initiation into service of a vessel which is the first all-steel motorship ever built by a West Coast transportation company for operation on the high seas. Never before has so much interest been taken in the new vessel by local shipowners, architects, engineers, shipbuilders and marine men generally, as was evidenced in the trial trip of the Diesel-driven freighter "Kennecott." Upon the operation of this new ship undoubtedly hinges not only the future policy of her owners, the Alaska Steamship Company of Seattle, but also of a number of other big coast shipping concerns, for it is a known fact that steamship men all along the western seaboard will be watching with vital interest the record made by this boat during the first year of her operation.

The "Kennecott" was built for operation in the coastwise and offshore trade. Her first voyage will be to San Pedro with lumber, after which she will return to the Sound and load cargo for the East Coast. Primarily, however, she was designed to carry ore, for the Alaska Steamship Co. is closely affiliated with the Kennecott Copper Corporation and during certain seasons when these mines are running full blast, the vessel will be used between the mines in Alaska and Chile and the Tacoma smelter. With a fuel-consumption which on her trial trip was approximately 0.42 lb. per shaft horsepower hour, or a total of only 55 barrels (under 8 tons) a day, and burning the same low gravity of oil used under the boilers of steamships, she will prove the most economical type of vessel ever used in this service.

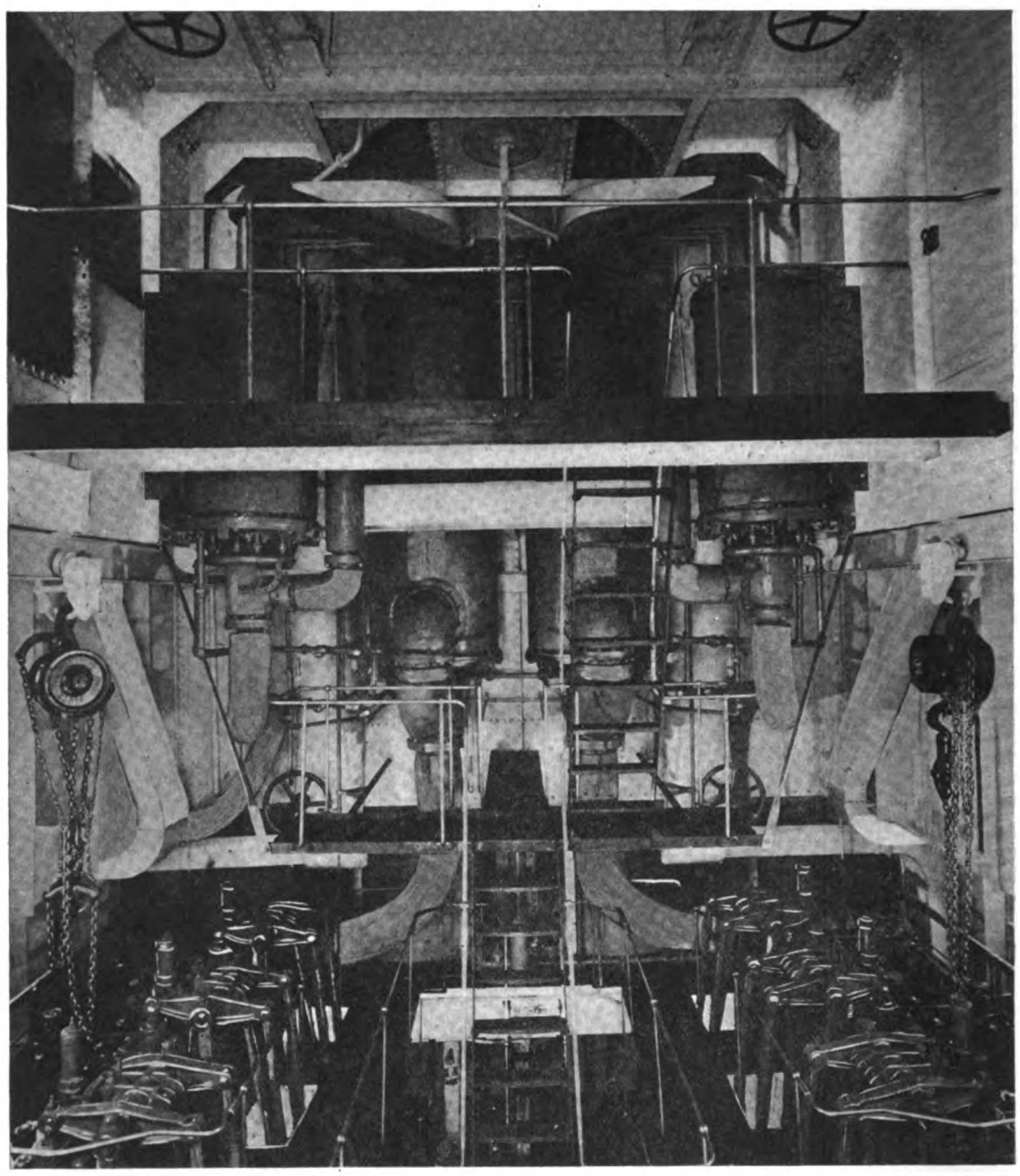
In design, construction and completeness of equipment, the "Kennecott" is undoubtedly one of the finest motorships so far built in any part of the world. She is the product of the plant of the Todd Dry Dock & Construction Corporation, at Tacoma, Washington, and was built by them in fifty working days, following the laying of the keel last November. The new vessel is of the usual "Three Island" type of steel freighter and has the following dimensions.



The first large all-American Pacific Coast built Diesel-driven steel motorship—the "Kennecott"—on her trial run. She is propelled by twin 1,200 i.h.p. McIntosh & Seymour oil-engines and is of 6,000 tons d.w.c. Owners—Alaska Steamship Co., Seattle, Wash. Builders—Todd Shipyards Corp.

Name of Ship	Kennecott
Name of Owner of Ship	Alaska Steamship Co., Seattle
Name of Builder of Ship	Todd D. D. & Constr. Co., Tacoma
Name of Engine Builder	McIntosh & Seymour Corp.
Class and Society	Approved by Lloyds (not classed)
Displacement (Loaded)	8,425 tons
Displacement (Light)	2,415 tons
Dead-weight-capacity of Ship	6,010 tons
Cubic-capacity of Holds	330,610 cu. ft.
Cargo Carried on Maiden Voyage	3,300,000 ft. Lumber
Length (O. A.)	360 ft.
Length (B. P.)	345 ft.
Breadth (Moulded)	49 ft. 6 in.
Depth (Moulded)	26 ft. 9 in.
Loaded Draught (Mean)	22 ft. 3 in.
Capacity of Fuel-bunkers (double bottom)	1,075 tons fuel oil*
Total Fresh-water Carried	49 tons
Cruising Radius	22,000 miles
Shaft Horse-power	1,800
Indicated Horse-power	2,400 (total)
Engine Speed	140 r. p. m.
Ship's Trial Speed (expected)	11½ knots
Ship's Speed (Loaded)	11½ knots
Average Speed on Maiden Voyage	11 knots
Propeller, Dia., Pitch and Area	11 ft. 6 in. dia. x 9 ft. 6 in. pitch; 32.5 sq. ft.
Daily Fuel-Consumption (with ship fully loaded)	55 bbls. a day
No. of Engine-room and Boiler Staff	(8) 3 engrs., 3 oilers, 1 electrician, 1 machinist
Daily Fuel-consumption in Port	¾ ton
Type of Diesel Engines	four-cycle
Cylinder Bore	21 inches
Piston Stroke	32 inches
Type of Deck Machinery	Electric
Length of Machinery Space	44 ft.
Date Put in Service	Mar. 17th, 1921

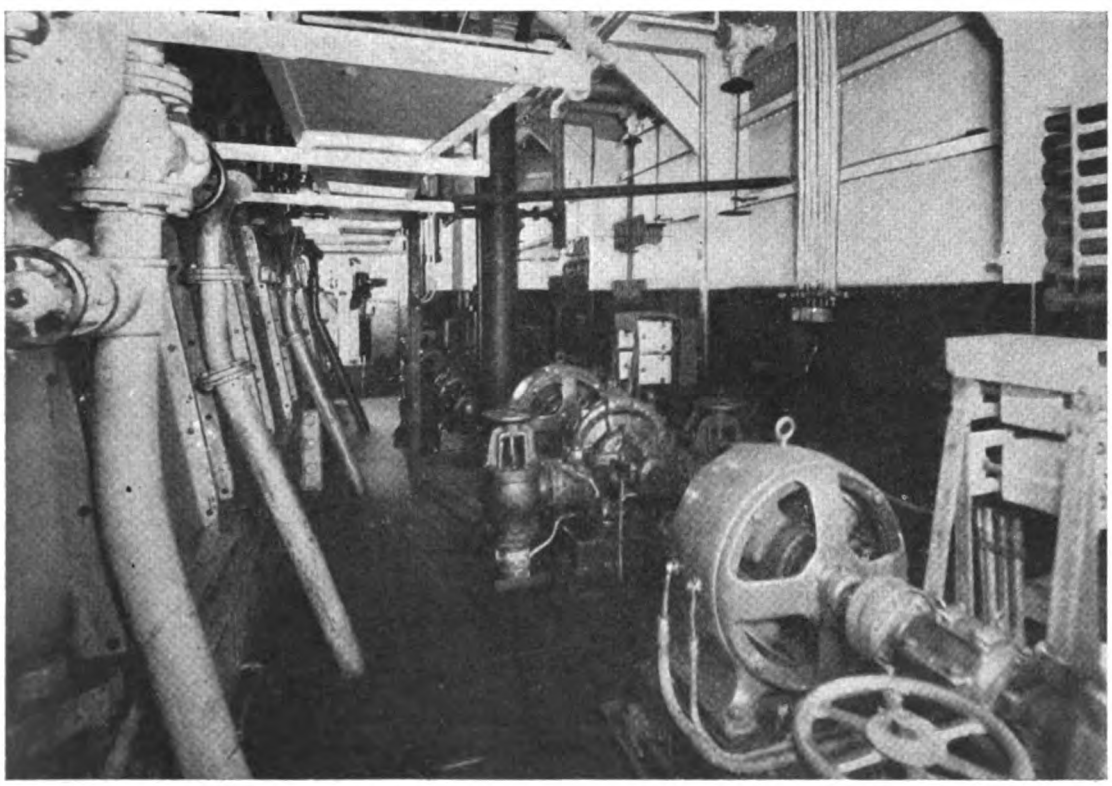
*About half of this oil will be oil-cargo.



Showing arrangement of exhaust-silencers from main and auxiliary Diesel-engines in engine-room of motorship "Kennecott." The silencers are equipped with a water-heating device for ship's service

The height to upper deck is 26 feet and the allowed draft 22 feet 1½ inches to the Summer freeboard mark, with a resulting deadweight of 6,010 tons at that draft. Her hull is built on the Isherwood longitudinal construction system and has four cargo-holds, three forward of the machinery space and one aft, the three forward holds having 'tween decks and the after hold extending from tank top to upper deck only.

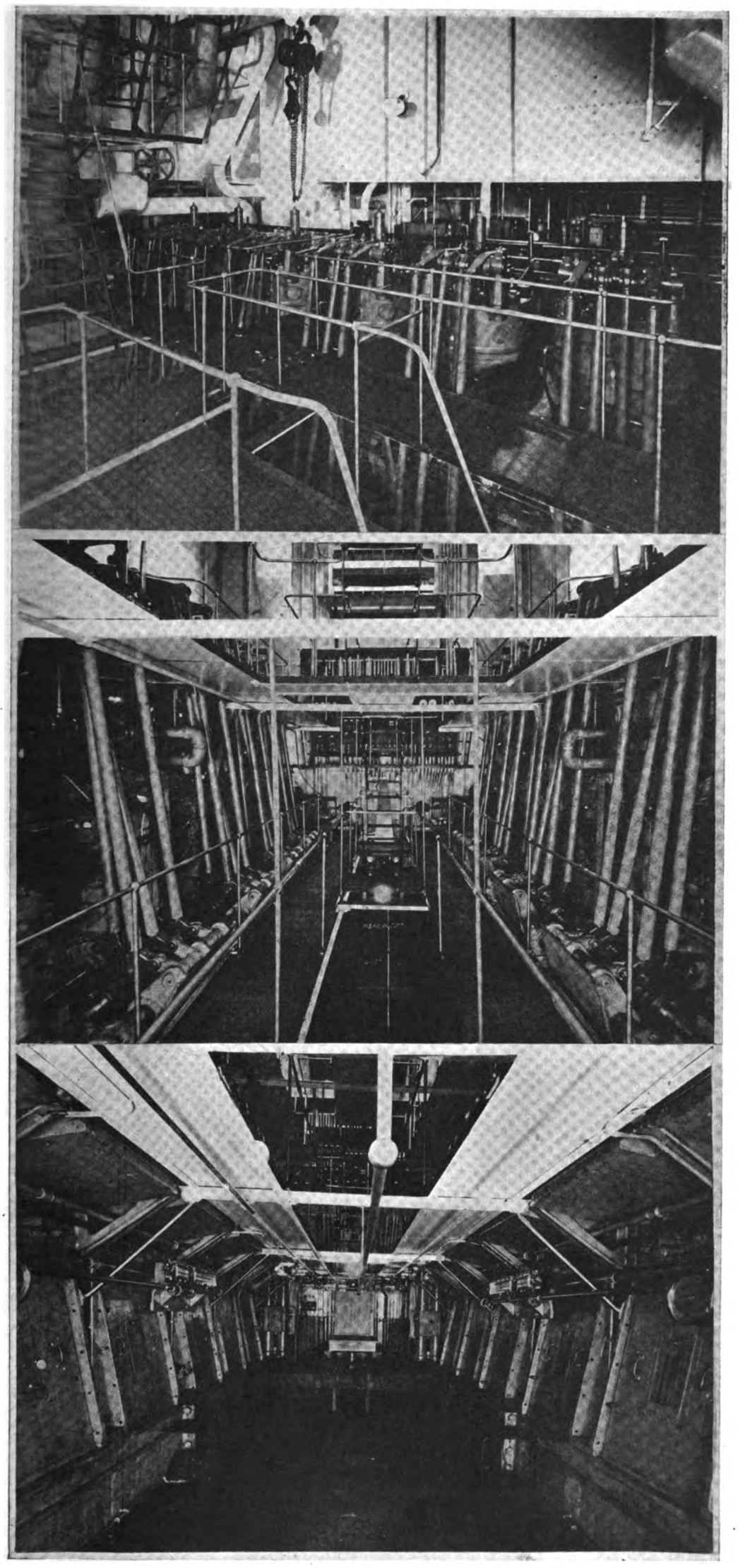
The machinery, which consists of two McIntosh & Seymour 4-cycle Diesel engines of 1200 I.H.P. or 900 B.H.P. and all necessary auxiliaries, as described later, is fitted about one-third length forward of the stern, and the shafting is carried in the Lundberg design of stern having spectacle frames at the after end, totally enclosing the shafts and eliminating the struts. The forward and after peaks of the vessel are fitted for carrying water ballast and fuel-oil is carried in the double-bottom tanks which extend from the forward and after peak bulkheads and also in a tank fitted between the shaft alley extending from the tank top to the top of the shaft alley, making a total fuel-capacity of 1,075 tons, giving the vessel a cruising radius of 22,000 miles. Her tanks were made unusually large so that she can if necessary transport oil for cargo from one port to another or carry it to the company's mines, which by the way are also operated by stationary Diesel engines of McIntosh & Seymour construction.



Electrically-driven pumps in the engine-room of the motorship "Kennecott." The motors are of the G.E.C. type

The cargo holds are so arranged that with the Isherwood transverses and wide-spaced pillars, clear stowage such as is desirable in ore-carrying boats, is allowed throughout. The rigging is also made especially heavy to allow of handling this type of cargo. There are two steel masts and two derrick posts. The foremast is fitted between No. 1 and 2 holds and has four 10-ton booms and one 30-ton boom. No. 3 hold is served by two king posts, each one having one 10-ton boom and No. 4 hold is served by the mainmast having two 10-ton booms. The 30-ton boom is of steel and is stepped in the centerline at No. 2 Hatch and so arranged that when not in use the boom can be stowed on deck alongside the hatch. All the 10-ton booms are of clear Douglas fir, fitted with plowsteel running-rigging proportioned to handle the weights specified.

The officers and crew are berthed in houses on the bridge deck amidship, the deck officers and engineer in the forward house on the bridge deck and the crew in the after-house. Captain's quarters, pilot-house and owner's quarters are in the house, chart-room, stateroom, office and private bath for captain, and pilot's room and owner's room with private bath. These quarters are ceiled with white quartered oak and furnished with the same wood. In the forward deck house are the saloon, staterooms for 1st, 2nd and 3rd officers,



Upper, center gratings and control-floor in the engine-room of the motorship "Kennecott"

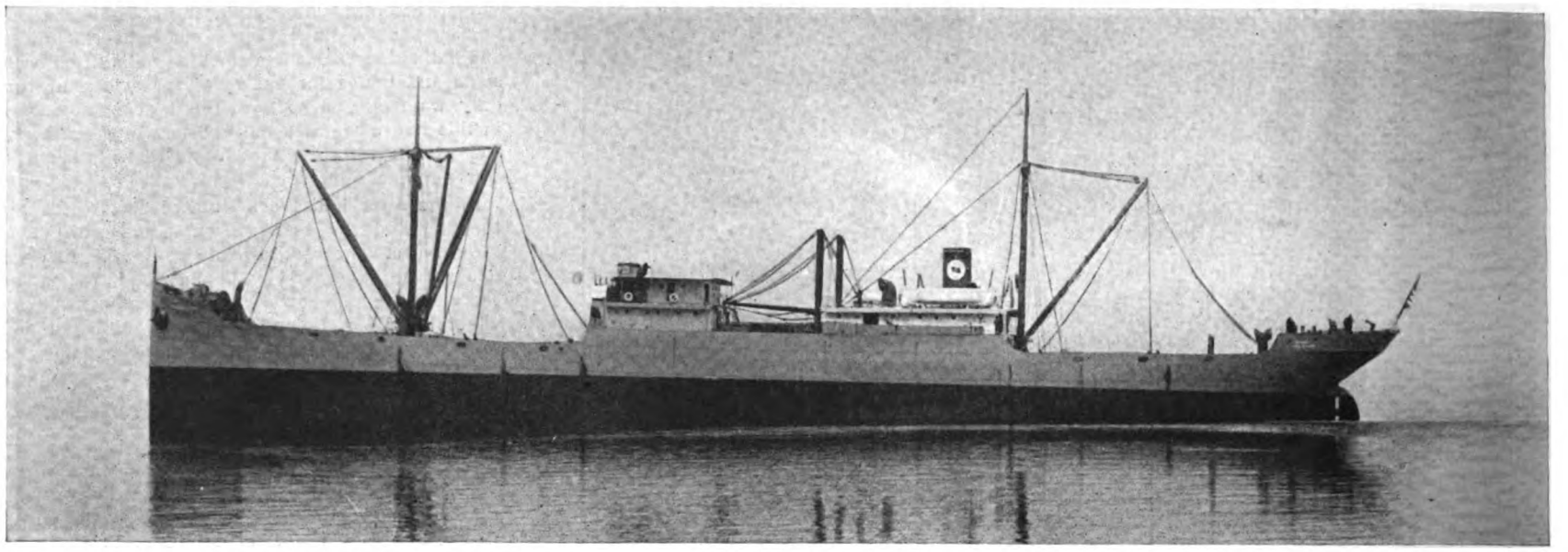
Purser, Steward, Chief-Engineer, 1st Assistant Engineer, pantry, linen stores and officers' toilets and bath. Here, also is a smoking-room fitted with seats and tables for use of officers when not on duty, a novelty on boats of this type. The rooms in this house are also finished in white quartered oak with furniture to match and there is running water in each stateroom.

In the after house are situated staterooms for the 2nd and 3rd assistant engineers with quartered oak furniture the same as in the forward house, also engineers' bath and toilet, rooms for carpenter and boatswain, cook, messboys, oilers, wipers and electrician, with separate baths and toilets for deck and engine room crew. The owners of the boat had their own ideas about her accommodations and laid particular stress upon having comfortable and roomy quarters for the crew and the boat as completed is arranged so that the crew are berthed not more than four in a room, these rooms having metal berths and lockers and running water. In this same house is the galley with oil-burning range, made by T. P. Jarvis of San Francisco, a small but well-equipped hospital and wireless-room and operator's quarters. The decks and passage in officers' and crews' quarters are laid with magnesite flooring with carpets or lineoleum covering same. All of the living quarters are heated with portable electric heaters supplied with current generated by the Diesel driven auxiliary plant. In fact, the vessel as completed, represents the highest type of cargo carrier and is a credit to our Merchant Marine.

The main interest to the engineer and to marine men generally, however, is in the engine-room, which is one of the most interesting and completely equipped that has ever been designed for an American motorship. It is but 44 ft. long. Every detail was carefully worked-out in advance by the engineers of the Alaska Steamship Co. in cooperation with the designers of the Todd Drydock & Construction Corporation's Tacoma plant, and nothing has been overlooked. The main engines were selected by Vice-President and General Manager E. T. Stannard of the Alaska Steamship Co. as a result of his previous experience and observation of the work of a number of McIntosh & Seymour stationary Diesel type of motors in the various mines of the Kennecott Copper Corporation. Mr. Stannard before going with the steamship company was a mining engineer by profession and had charge of the Kennecott interests in Alaska which are still under his supervision. In the north he had an excellent opportunity to observe the service given by the Diesel engines in the mines and found them thoroughly satisfactory in every particular, so that he had very definite ideas regarding this type of motor. In his opinion, the four-cycle, heavy duty type of engine is best suited to the heavy work necessary in a freighter like the "Kennecott" and he therefore settled upon the McIntosh & Seymour engines for the new boat. While these engines are the standard stock models as turned out at present by the McIntosh & Seymour Corporation of Auburn, New York, they are nevertheless unique in that they are the first of the new open crosshead type as now made by this company to be installed, and in fact are the largest marine engines which this company have so far completed although a 2,000 I.H.P. engine is now under construction.

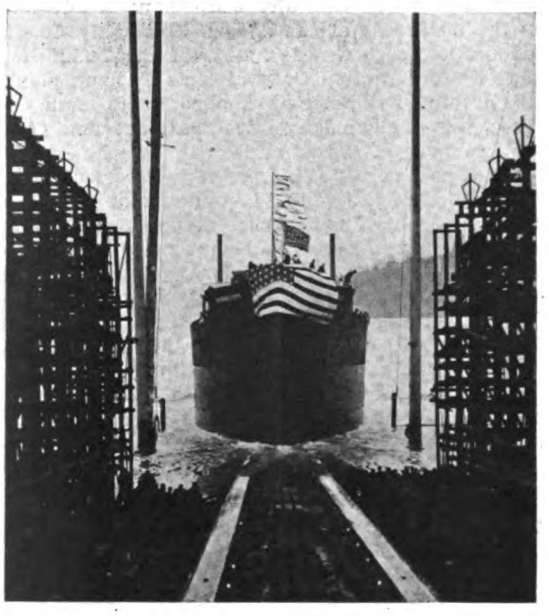
Eighteen of the 1,200 i.h.p. engines were ordered for the Emergency Fleet Corporation toward the end of the war and these motors are the first pair to be completed under this order, although a number of them have been finished since. They are six-cylinder engines of 1,200 i.h.p. (900b.h.p.) each, developing their power at 140 r.p.m. and giving the boat a speed running light of 12½ knots and loaded of from 11 to 11½ knots By the use of a specially designed preheating system for the fuel, the motors are enabled to operate successfully on fuel of 16.7 degrees Baume, the same oil that is burned under the boilers of steamships. This feature, in itself, has effected a great economy for the boat as most of the motorships so far built on the Pacific have been forced to operate on Diesol and Calol which is about 21 degrees to 24 degrees gravity.

The preheating of the fuel is accomplished by means of steamcoils installed in the silencers. In the stack, through which the motors exhaust is a



Broadside view of the "Kennecott" in light condition. She was built by the Todd Shipyards Corporation's Tacoma plant. On her maiden-voyage she loaded 3,300,000 ft. of lumber

head tank filled with water which circulates down through these coils in the silencers and after being heated passes on through the inside of the daily service tanks where the oil for the engines is preheated to a temperature of 130 degrees, the pipes then passing on down through the inner bottoms and heating the oil there, the circulation of the water being forced by means of a centrifugal pump of the Cameron, motor-driven, single stage type. The temperature of the water from the coils is regulated by a by-pass feature at the silencers which permits of absolute regulation.



Launch of the motorship "Kennecott"

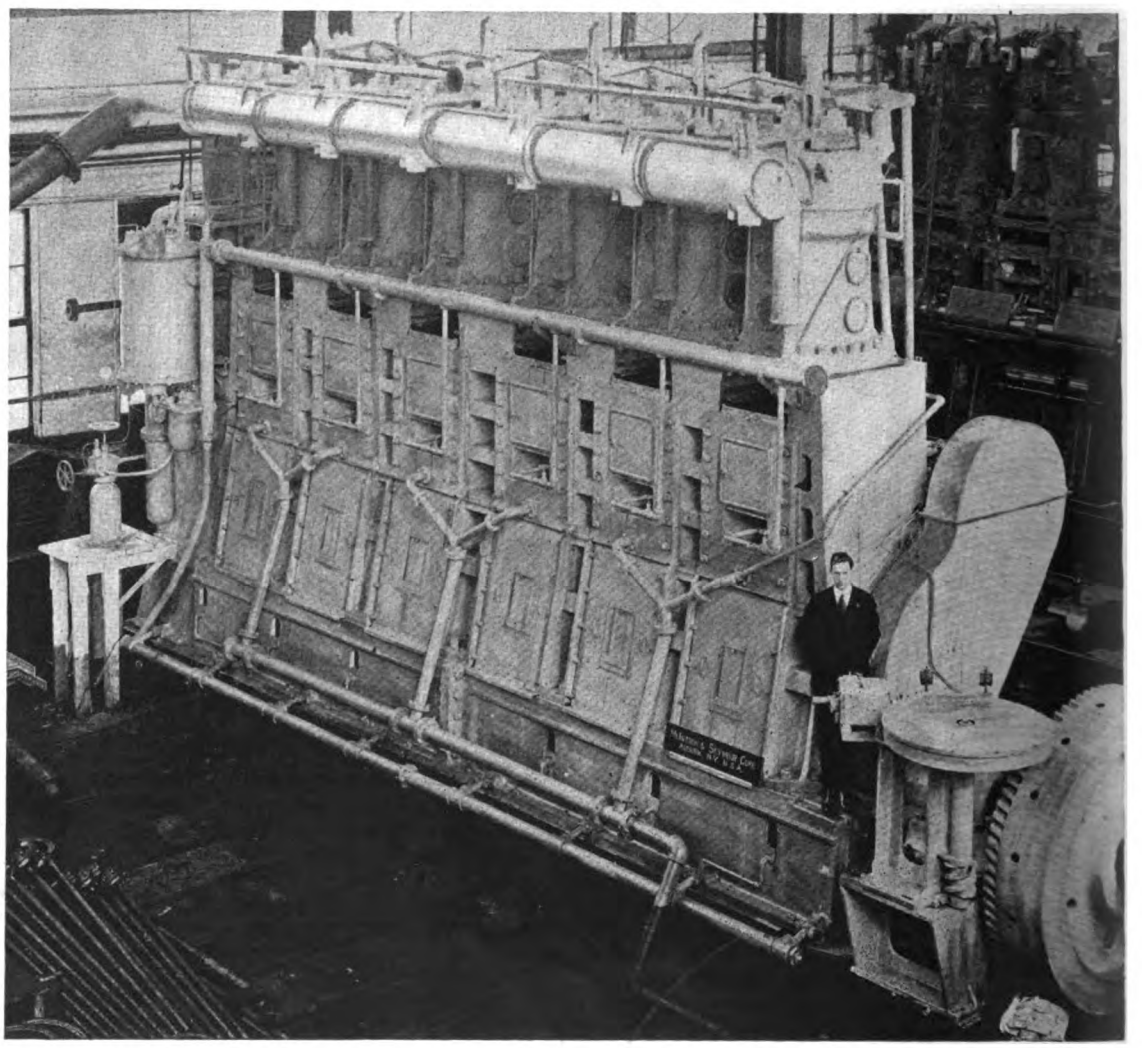
All of the auxiliary machinery on the ship is electrically driven. With the exception of the heating-coils mentioned above there is not a steam pipe on the entire vessel. The current is generated by two 100 i.h.p. McIntosh & Seymour auxiliary Diesel-engines driving 75 kw. General Electric generators which supply the current direct for operating all of the pumps, deck-machinery, lighting plant, etc., and also charge the emergency set of 100 cells of Edison A4 storage batteries. These batteries are used for emergency lighting, for the auxiliary compressor and the galley oilpump which supplies oil to the burner in the range.

The circulating-water for the cylinder jackets and piston cooling is supplied by two single-stage motor-driven pumps made by the A. S. Cameron Steam Pump Works, of New York City, who also made the three-stage centrifugal fire and bilge-pumps. There is also another bilge pump of the double-suction centrifugal type made by the Cameron people and a pump of the rotating plunger type made by the Kinney Manufacturing Co. of Boston, Mass. There are two oil-transfer pumps of the Kinney rotary plunger type and a motor-driven fresh water pump of the single-stage centrifugal type made by the Cameron people. Lubricating-oil is handled by three Kinney pumps of the rotary plunger type, and the hot water circulating pump, previously mentioned is of the Cameron single-stage centrifugal type.

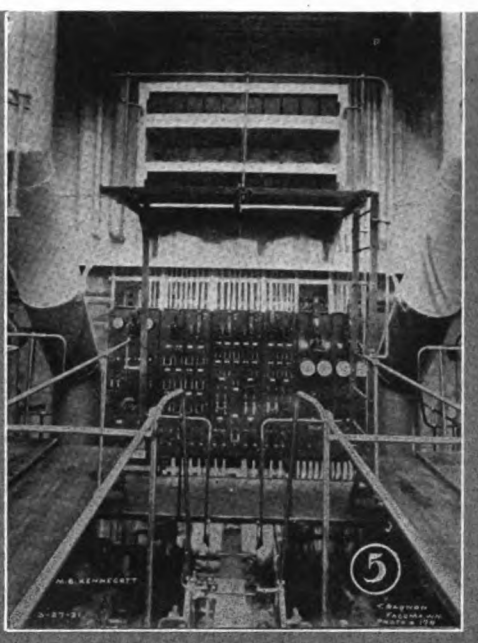
The daily service tanks for fuel are unusually large, there being three of them, each with a capacity of five tons. The main lubricating-oil tanks holds 2,000 gallons and there is also a 1,000 gallon oil settling tank. Another 1,000 gallon tank is provided for kerosene and a number of smaller tanks are installed for miscellaneous lubricating-oils and one for compressor oil. Two large tanks are also installed for the storage of maneuvering air. All the tanks are of steel and were built at the Todd yards which built everything connected with the boat except the machinery. The only wood aboard the boat is in the lockers and bins for the engineers' storeroom, everything else being of steel. The engineers have the advantage of a fully-equipped machine-shop with lathe, drill presses and grinder and can make all of the necessary everyday repairs aboard the boat.

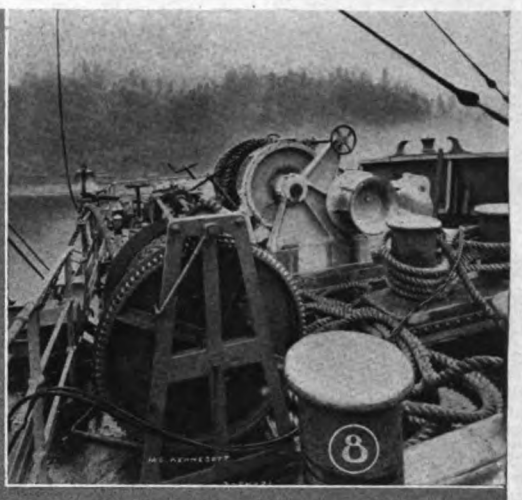
The filtering system for the lubricating-oil is worthy of mention. The oil, after passing through the engine, falls by gravity to the crank-pits and from there to the pump tanks underneath the engine room floor plates. There are three continually operated filters of the Richardson-Phoenix type, two sizes, No. 90 for the main engines and one size No. 80 for the auxiliary engines. The pumps heretofore mentioned pump oil through the system and when it gets dirty through the filters. One pump handles the oil from the sump tank to the filters, the second pump from the filters back to the system and the third pump is a relay.

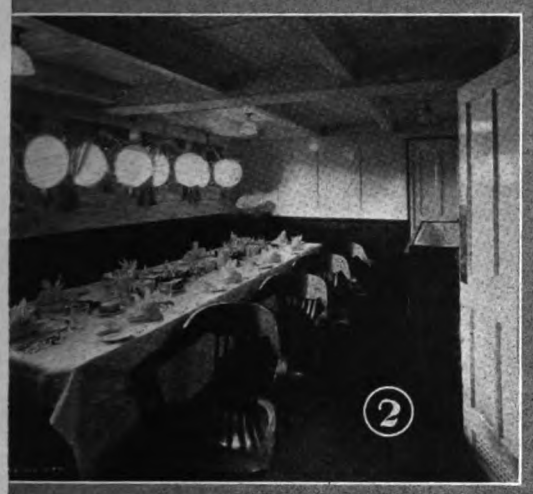
The engine-room also contains a one-ton refrigerating plant of the direct-expansion ammonia type, using the Brunswick Refrigerating Company's machines, electrically driven. The engines exhaust through the boat's stack. This stack is divided into two parts. One section is heated by the hot-water pipes after leaving the silencers thus providing a heated space which is used to provide ventilation for the lower engine-room by

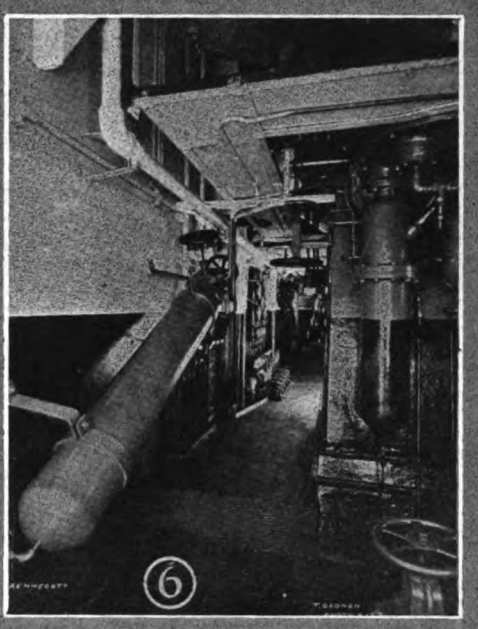


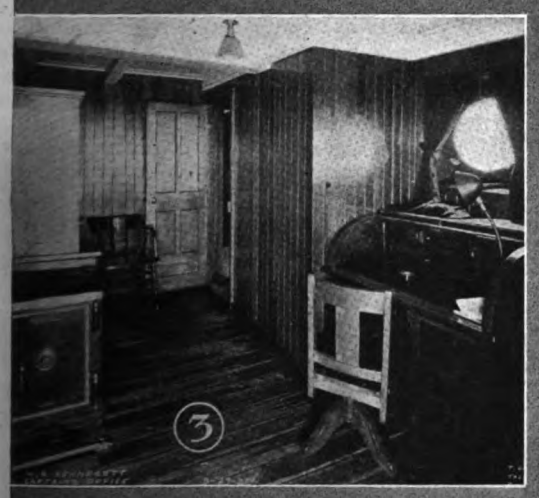
One of the new 1,200 i.h.p. crosshead type McIntosh & Seymour Diesel engines of the "Kennecott"

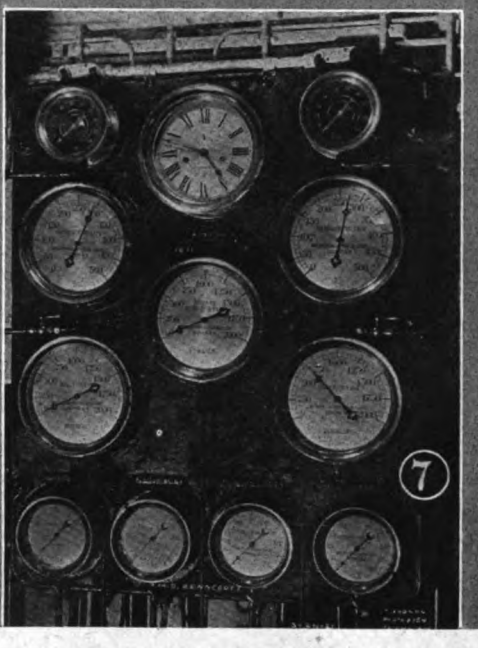


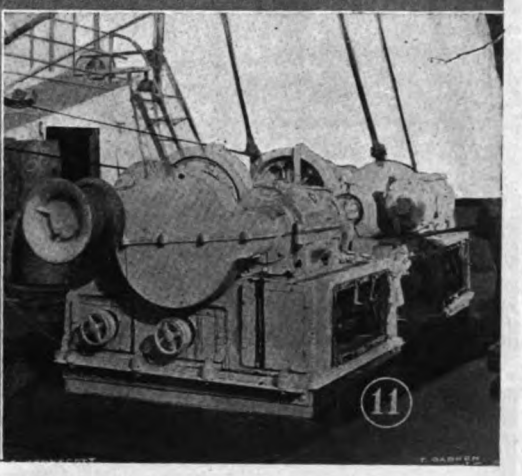




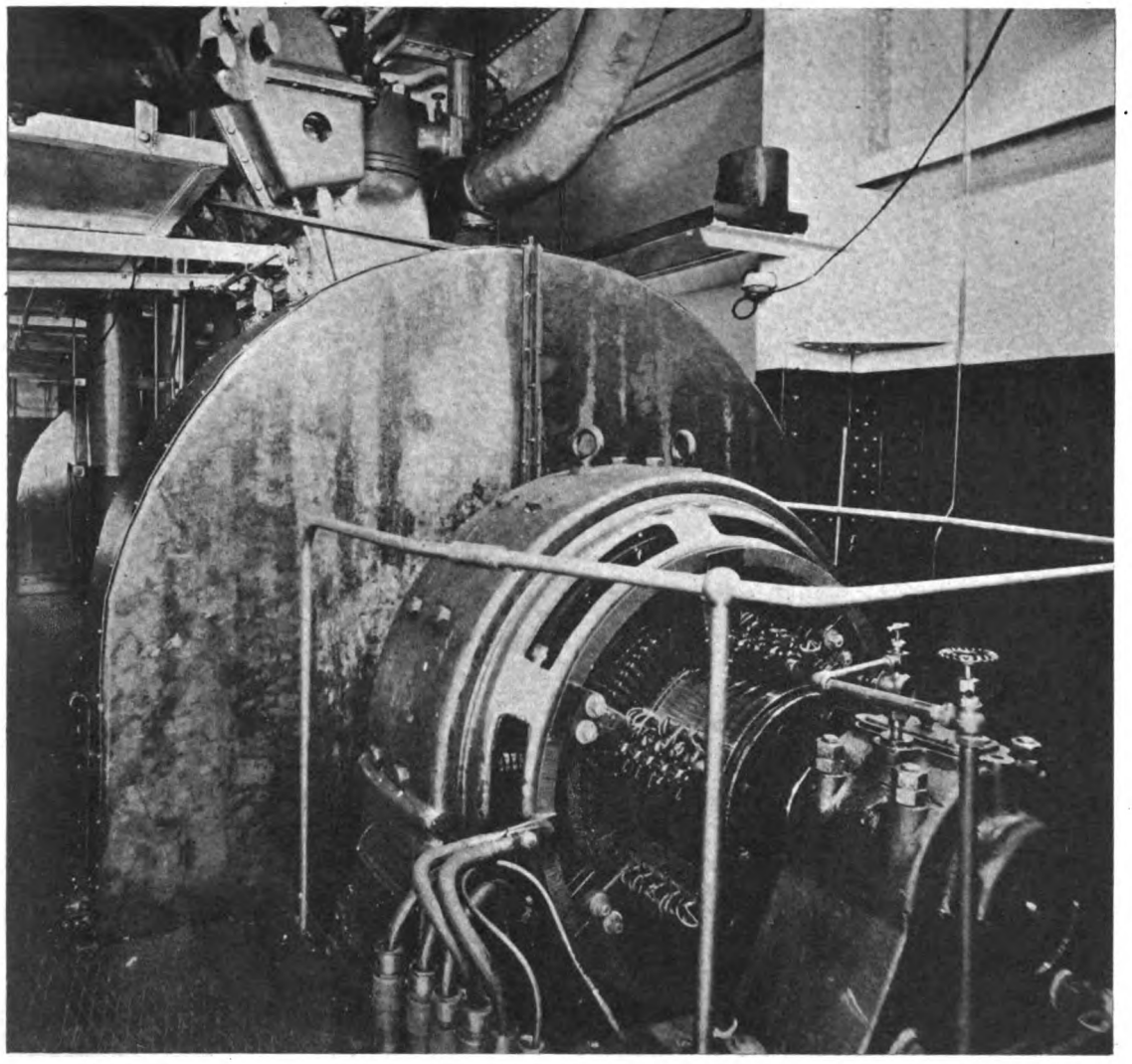








(1) Allan-Cunningham steering-gear and telemotor.
(2) Dining-saloon.
(3) Captain's cabin.
(4) Galley.
(5) Switchboard and storage batteries.
(6) Fuel-oil and ballast manifolds. Also forward ends of main engines showing control-levers and injection-bottles.
(7) Gauge-panel with lubricating-oil and manoeuvring air-gauges.
(8) 75 h.p. electric-winch.
(9) Deck view of "Kennecott" showing two hatches and group of electric-winches.
(10) No. 4 hatch looking forward to entrance of shelter deck.
(11) Electric-winches at forward end of No.3 hatch.



75 K.W. G.E.C. generator coupled to a 100 b.h.p. McIntosh & Seymour auxiliary Diesel engine in the "Kennecott's" engine-room

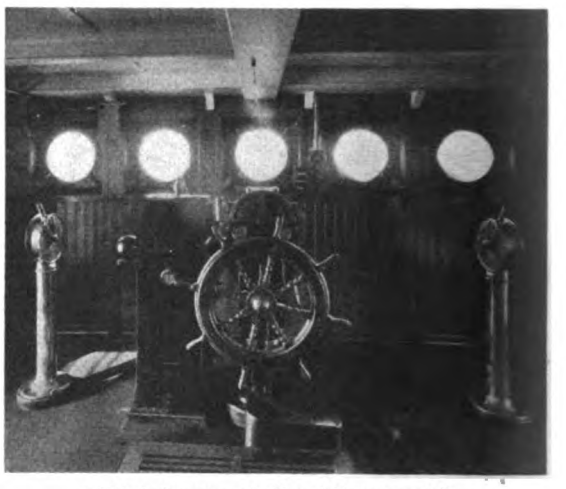
means of a vacuum system which drains off all the bad gases. The other section is used for upper engine room ventilation and also contains the head tank for the hot water system previously described. The stack is therefore virtually a room stood on end and if not very ornamental is very useful.

With this system the engine-room ventilation is exceptionally well provided for. Four 24-inch ventilators are operated continuously and fresh air is diffused uniformly all over the motor compartment. In order to prevent the high-pressure compressors from picking up dangerous gases in the engine-room, suction-pipes have been provided from the ventilators to the compressors, thus assuring a supply of fresh, cold air at all times.

The air-compressor was manufactured by the Rix Compressed Air & Drill Co. of San Francisco and Los Angeles. The signalling apparatus consist of an air-whistle on the for'd side of the smoke-stack and also an electrically-driven siren manufactured by the Hendrie & Boulthoff Mfg. Co. of Denver, operated by a 3 h.p. motor.

Electrically-driven deck machinery is one of the most noteworthy features of the ship and attracted as much attention on the trial trip as any other items of the vessel's equipment. It consists of the anchor-windlass, capstan, eight cargo-winches and the electro-hydraulic steering-gear. It was all designed and manufactured by the Allan Cunningham Company of Seattle who specialize in this sort of machinery, principally using G. E. C. motors.

The anchor windlass is situated on the foc'sle head and is of the Cunningham electric self-contained type with a combination spur and worm-gear. The worm-gear is of phosphor-bronze with forged-steel worm with ball-thrust bearings. The main reduction-gear is steel spur-gearing and the bearings are all adjustable bronze shaft-bearings. There are two cast-steel wildcats for 2 1/16 inch

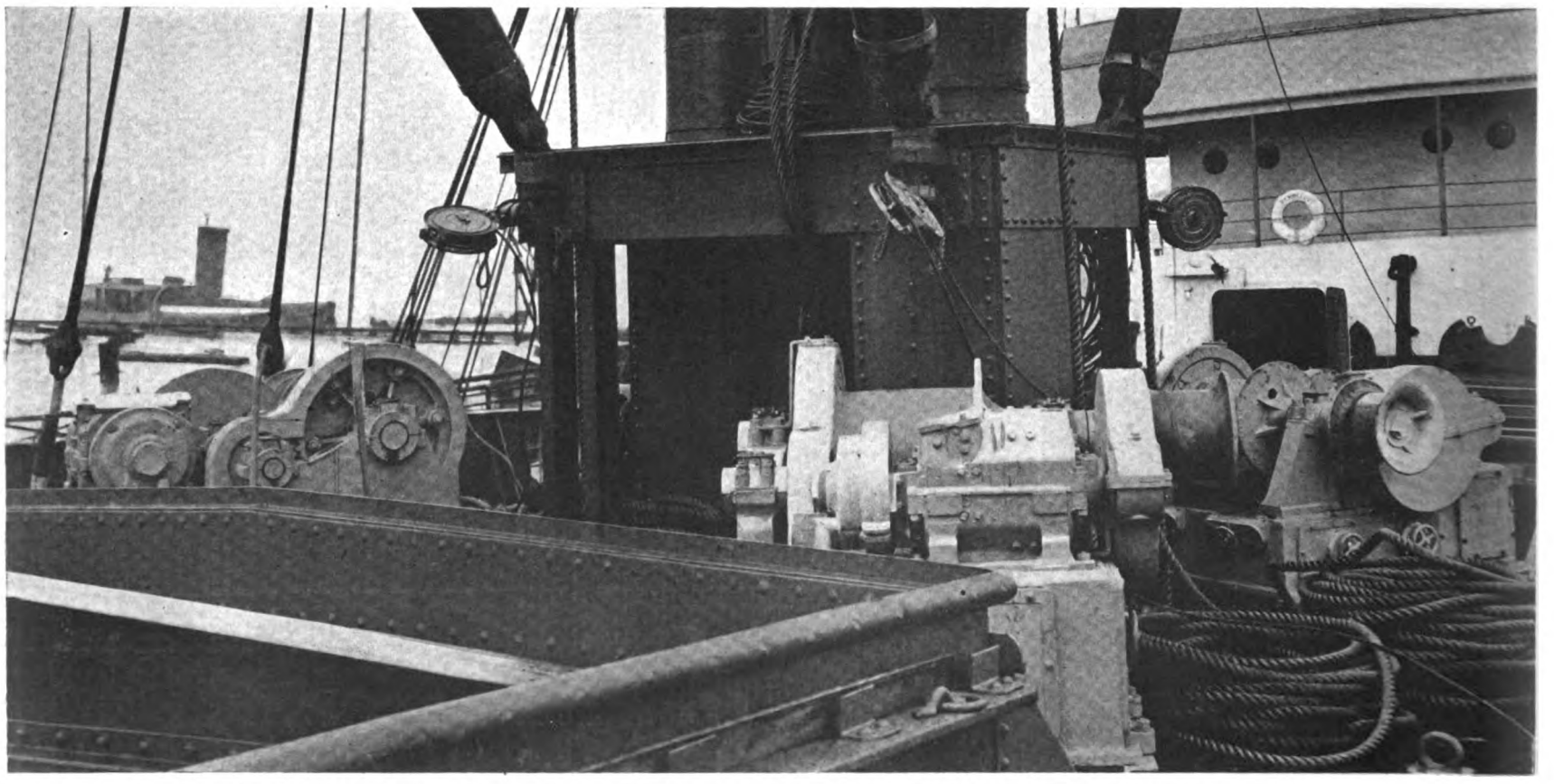


Pilot house of the "Kennecott"

chain and two quick-warping heads on the intermediate shaft. The windlass is sufficiently pow ered to heave both anchors at once in 70 fathoms of water.

The electric capstan is on the poop deck and has an 11½-inch barrel. It is fitted with handbar head for hand operation in emergencies. The base is divided into two compartments, one of which carries all the gearing which runs in a bath of oil. The other compartment contains the motor and control apparatus, all of which is completely enclosed in the waterproof compartment. The capstan bearings are all adjustable bronze.

Six of the eight electric cargo-winches are of the Cunningham patent self-contained hollow-base

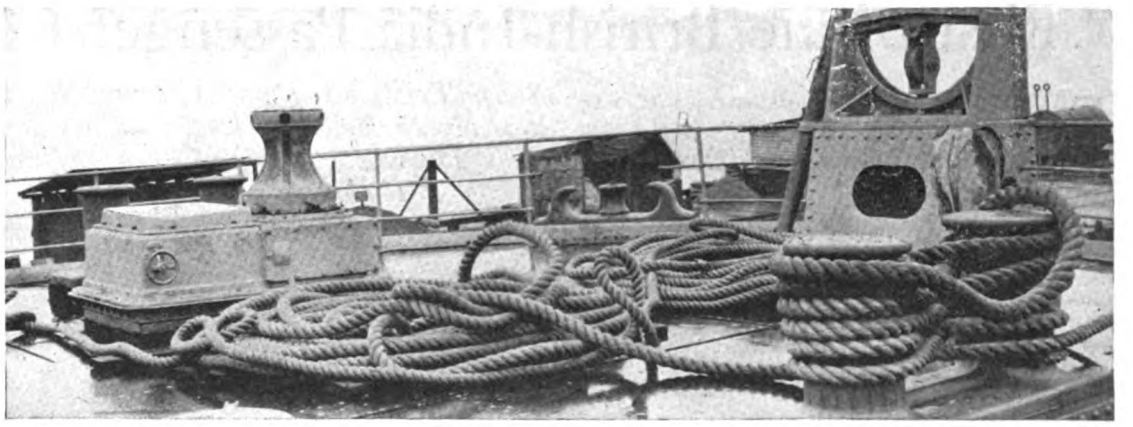


Three of the Allan-Cunningham-General Electric motor-winches on the deck of the "Kennecott"

type and carry all the control apparatus in the base of the winch. The controllers are operated by a pump lever which is raised to hoist and pushed down to lower in the same way as a throttle-reversing steam winch. This enables one man to operate two winches in accordance with usual Pacific Coast practise. The winches are driven by 25 h.p. G. E. C. marine type motors and have a lifting capacity of 4,000 lbs. and 250 ft. per minute and heavier loads at corresponding rope speeds up to a maximum lift of 15,000 lbs. The winches are double reduction; the first gear-reduction is cut herringbone gearing running in a bath of oil in an oil-tight gear casing; the second or main reduction is machine-cut spur-gearing fitted with substantial and close-fitting flanged gear-guards. Both main and intermediate shafts run in adjustable bronze bearings. A waterproof magnetic dish holding-brake, fitted with simple external adjustments is fitted to the armature shaft of each motor. This brake is merely a safety holding device, however, and is not used in lowering, the lowering control being accomplished by a system of dynamic braking which gives a range of speed control in lowering from creeping to practically free dropping speed. The winches are provided with safety devices to prevent accident from any possible cause.

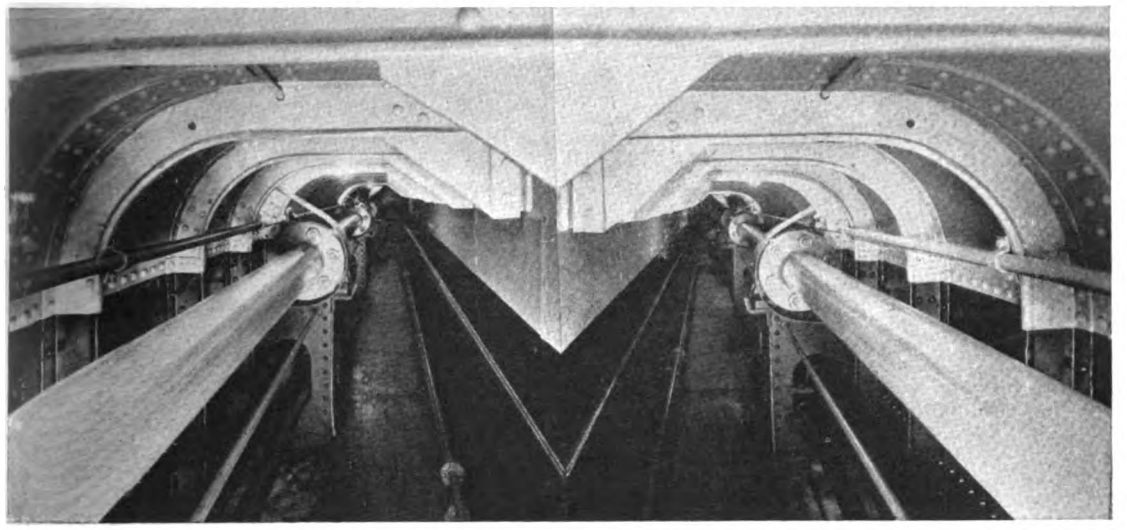
The two winches on the bridge-deck are designed for remote control on account of the fact that it was impossible to arrange winches at this hatch close enough together for operation by pump-levers. The two controllers are mounted in a waterproof control-box which stands right against the hatch combing so that the operator can look down into the hatch while manipulating them.

The powerful deck machinery and cargo-booms



Electric capstan of the "Kennecott"

are a notable feature of this boat and she has been equipped to handle not only the heaviest kind of ore but also machinery or mine locomotives if necessary. The hatches are also of unusual size. There are four hatches on the main deck and four below on the 'tween decks, the largest ones being 18 x 28 ft. and the smaller ones 18 x 24 ft.



Twin propeller-shaft tunnels of the "Kennecott"

Probably the one feature that has attracted more attention than any other about the boat is the Cunningham electric steering-gear. This is a new type of electro-hydraulic gear controlled from the bridge by a duplex ram type of hydraulic telemotor of the McTaggart-Scott design as built by the Allan Cunningham Co., who are the McTaggart-Scott United States licensees. The steering gear itself is of the geared-spring quadrant type in which a tiller is keyed solidly to the rudder-stock and the tiller in turn is fastened to a floating quadrant by means of compression springs. The permimeter of the quadrant is fitted with gear-teeth which are fastened to it in blocks of five teeth to the block. The gear quadrant meshes with the driving-pinion of the steering-engine which in turn is driven through worm-gearing by a 15 h.p. G. E. C. motor through a Waterbury hydraulic variable-speed gear. The motor is controlled by a contactor type controller with automatic re-starting device and numerous other safety devices which prevent damage to the steering-gear and ensure its immediate return to normal operating conditions in event of temporary interruption of the current or abnormal variations in voltage. The steering-gear is extremely silent in operation as well as being unusually efficient.

The vessel is also provided with a Cunningham towing chock and foundations have been provided for an electric towing machine which will be installed later.

Other interesting features of the "Kennecott's" equipment include the 2 kw. wiring set installed by Kilbourne & Clark, Seattle; a 110 volt 25 amp. searchlight of the Carlisle-Finch type; a system of Magnovox intercommunicating telephones; an electric driven jacking gear made by McIntosh & Seymour Corporation for turning up the main engines; a hand bilge and fire pump made by the Rumsey Pump Co. of Senaca Falls, N. Y., and special davit equipment manufactured by the Steward Davit & Equipment Co., New York City. The plumbing was supplied by the Crane Co., Chicago, and the compasses, binnacle and other navigating instruments by Max Kuner of Seattle.

On her maiden voyage from Bellingham to San Pedro, the "Kennecott" averaged 11 knots with full-load of cargo, burning heavy crude-oil. The trip took four days and five hours. She is now en route for New York, and should be inspected by all shipping interests in that city upon arrival.

ANTI-NOISE TELEPHONE FOR MOTORSHIPS.

Like many inventions that have benefited mankind, the anti-noise transmitter developed by Peter L. Jensen and Edwin S. Pridham, engineers of the Magnavox Company and pioneers in the adaptation to commercial use of the electro-dynamic principle of telephone reception, is exceedingly simple. Most of us have memories of exasperation incidents of trying to carry on telephone conversations against outside noises of any sort—from the tintinnabulation of a riveting hammer on the steel building next door to the roar of the elevated railroad under our own office windows, and consequently endeavor to visualize some scheme for eliminating from the line all foreign sound, but there arise visions of complicated retardation-coils and sound-proof face masks and the like or else a hot, stuffy booth. And with these preconceptions in mind, the first glimpse of the Magnavox device that has made undisturbed telephone communication possible under the most harrowing conditions of outside noises and disturbances is apt to produce a distinct mental jolt. For, with the exception of the light and astonishingly small aluminum protecting case, the small brackets that hold the instrument at the proper distance from the operator's mouth, the whole device would almost pass for the case of an Ingersoll watch.

Instead of going at the problem from the only too natural angle of attempting to exclude outside noise from the diaphragm, the designers boldly stripped from the essential mechanism of the carbon granule transmitter—the diaphragm and the "button"—every encasement whatever likely to exclude a bit of the circumambient racket. In other words, they threw open the doors and let all the noise in. Cannily, however, they opened both the front and back door as it were. That is, they allowed the mixture of extraneous sound-waves equally free access to both sides of the diaphragm. The result was unqualified success, a diaphragm that is immune from all influence save that to which it is desired it shall be susceptible—the voice of the person using it—and a transmitter that will carry that voice and nothing else.

To illustrate the simple principle involved, imagine a huge flat gong of the Chinese tom-tom type, suspended by one edge. Then imagine the gong being struck on both sides simultaneously by hammers of equal weight, the blows being equal in force. The gong will not vibrate. Then imagine either a small supplementary hammer striking one side of the gong along with one of the two hammers—or, what amounts to the same thing, a slight increment in the weight of one of the hammers or in the force of its blow. The gong will then vibrate, in direct measure to the additional impulses on one side.

The effect of the twin hammers on the gong is analogous to the effect of extraneous sound-waves, due to any near-by noises, on the transmitter diaphragm (since the sound waves are freely admitted to both sides of the diaphragm). In practice, as in theory, they set up no vibrations. Therefore they cause no "side-tone," as transmitter disturbance is designated in telephone parlance. The diaphragm is left free to vibrate solely to the directed voice-waves, from the lips of the operator, impinging against one side only.

The engine-room of a motorship or in the pump-room of a tanker are typical examples of places where the use of an ordinary telephone-transmitter would be entirely out of the question. Also, the instruments are for communication between the bridge of the vessel and the compartment aft in which is located the mechanical steering-gear—just over the rear of the propeller shaft, and one of the noisiest places on a vessel. [Crossing the North Sea on a crowded ship in 1919, our cabin was located under the steering-gear.—Editor.] In case of mishap to the steering apparatus on the bridge, communication is immediately established from the bridge to the steering-engine compartment, and the officer on the bridge then directs the engine-operator who, with the equipment on his head, is free to devote his entire attention to the control of the steering-engine or emergency steering-wheel.

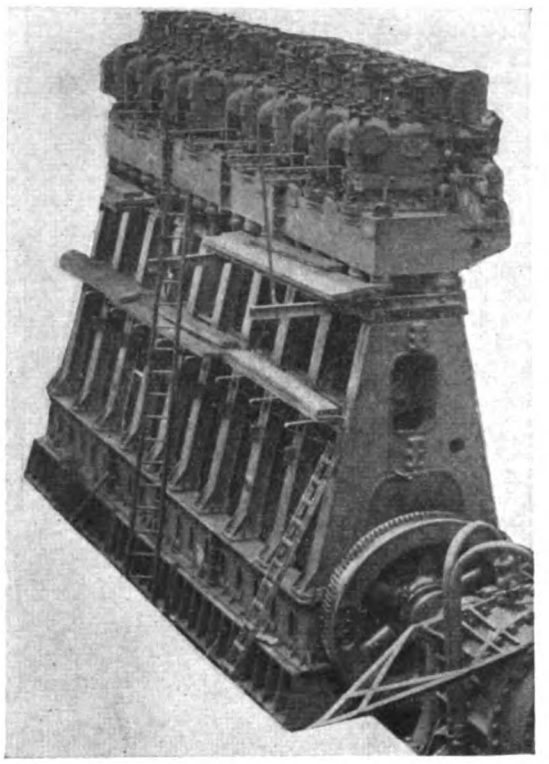
First of the British-India Passenger Cargo Motor-Liners

Shop Trials of Pair of 2,000 Shaft h.p. North British Diesel-Engines for the "Domala," a New Ship of the Combination Type

TRIALS of a pair of Diesel-engines of new design and construction have just been successfully run in Scotland at the works of the North British Diesel Engine Company, Whiteinch, Glasgow, a 7 days' non-stop run at full-load having been completed by the port engine. These oil-engines are being installed in the first of several combination passenger-cargo motor-liners now nearing completion to the order of the British India Steam Navigation Company, two of the hulls having been built by Barclay, Curle & Co.

Unfortunately, none of these fine ships, the first of which was named "Magnavana," but has had her name changed to "Domala," is likely to be seen in American waters, as they will regularly trade between London and Calcutta via the Suez Canal. But, the illustrations and description which we give will afford a comprehensive conception of these vessels and their machinery. They are of a class that "Motorship" has repeatedly urged construction in the United States. "Melma" and "Melita" are the names of two of the craft. Another motorship is building by Denny Bros. of Dumbarton, Scotland, for the Union Steamship Company, New Zealand, which is a subsidiary of the B.I.S.N. Co., but the latter motorship is a 10,500 tons d.w.c. freighter, and will not carry a large number of passengers like the other ships.

Both these prominent shipowning companies for a long while have been subscribers to "Motorship," and news regarding the ordering of this interesting fleet was published in our issue of November, 1919, prior to appearing elsewhere. Altogether eight Diesel-driven motorships are building for the B.I.S.N. Co. and its subsidiaries, and all but one will have four-cycle Diesel-engines—the exception being a vessel of 430-ft. length b.p. and 3,200 shaft h.p. building by Alexander Stephen & Sons of Govan, in which will be installed Stephen-Sulzer two-cycle type Diesel-engines, equipped with electric-driven turbo-blower scavenging. Two of the remaining vessels are small ships of 2,050 tons loaded displacement and of 1,200 i.h.p. now building by Charles Hill & Son, Ltd., of Bristol, England. North British four-cycle Diesel-engines will be installed in these craft.

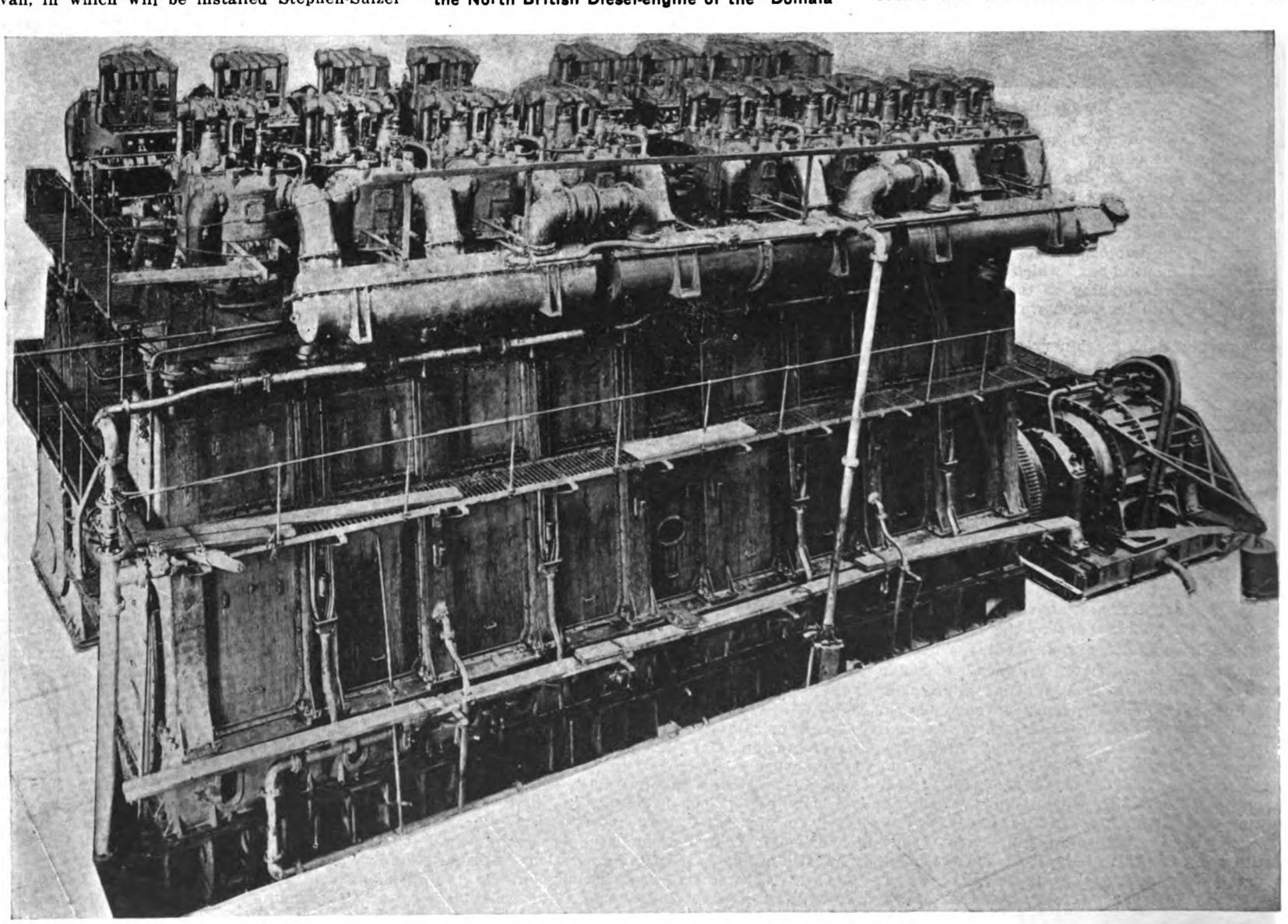


Showing framing and cylinder-box construction of the North British Diesel-engine of the "Domala"

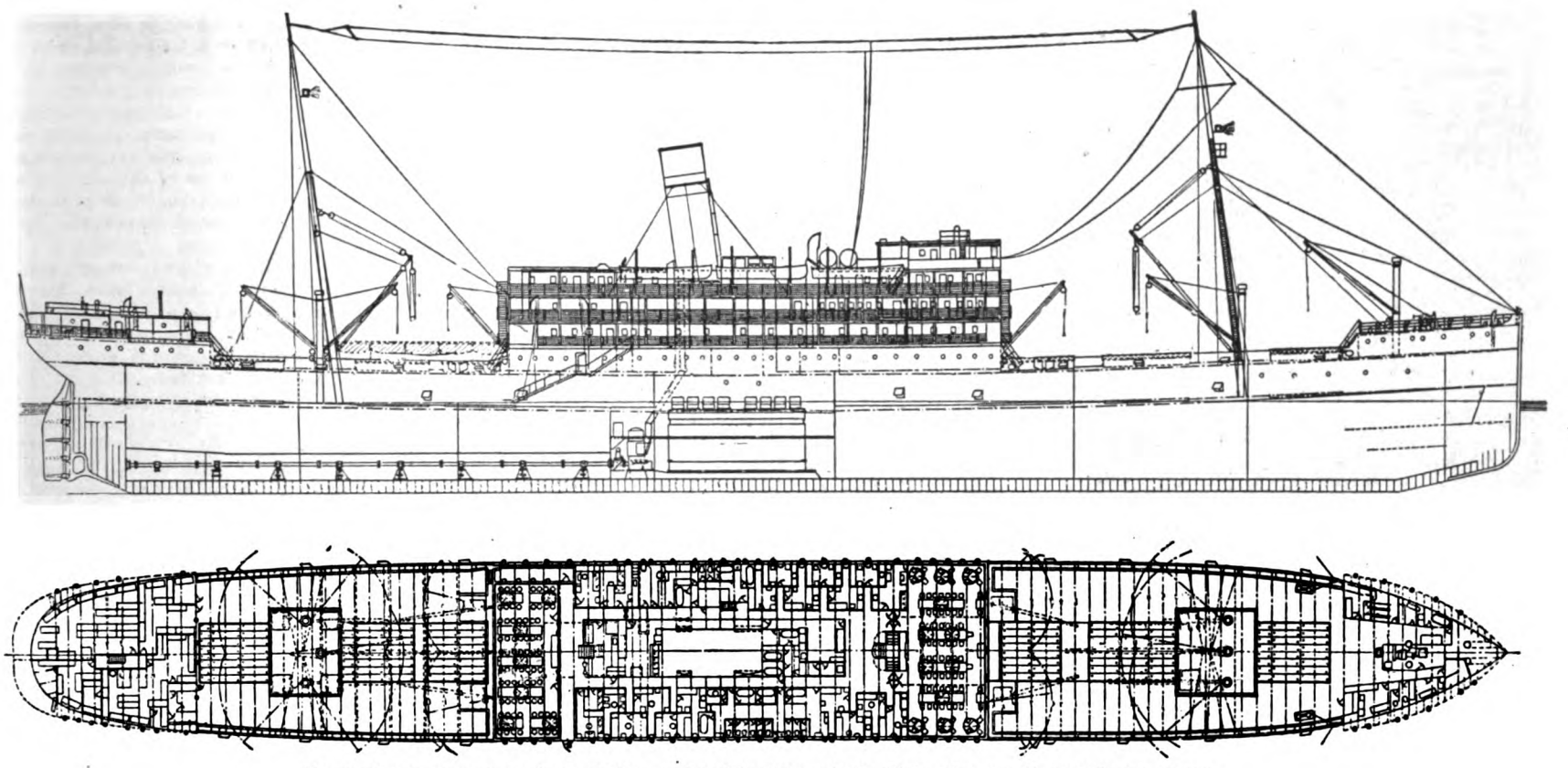
One of the illustrations shows the motorship "Domala," which is the first of their fleet to receive North British Diesel-engines. We also give drawings of her machinery arrangements and engines, and for a vessel of her speed and power her machinery space is small, being only 56 ft. in length. Her general dimensions are as follows:

Deadweight-capacity	10,500 tons
Passenger capacity	100 first-class, 50 second-class
Length O.A.	464 ft.
Length B.P.	450 ft.
Depth (md.) to U.D.	35 ft. 6 in.
Gross tonnage	8,500
Designed sea speed (loaded)	13½ knots
Power main engines	4,600 i.h.p. (4,000 shaft h.p.)
Power, auxiliaries	1,400 b.h.p.
Total power	6,000 i.h.p.
No. of cyl. main engines	8 per engine
Cyl. power and piston stroke	26½ in. x 47 in.
Engine speed	96 r.p.m.
Piston speed	752 ft. per min.
Daily fuel-consumption (main engines)	18 tons
Fuel-oil used on test-bed	Anglo-Persian
Fuel-consumption	0.42 lb. per b.h.p.
Time of reversing	8 seconds

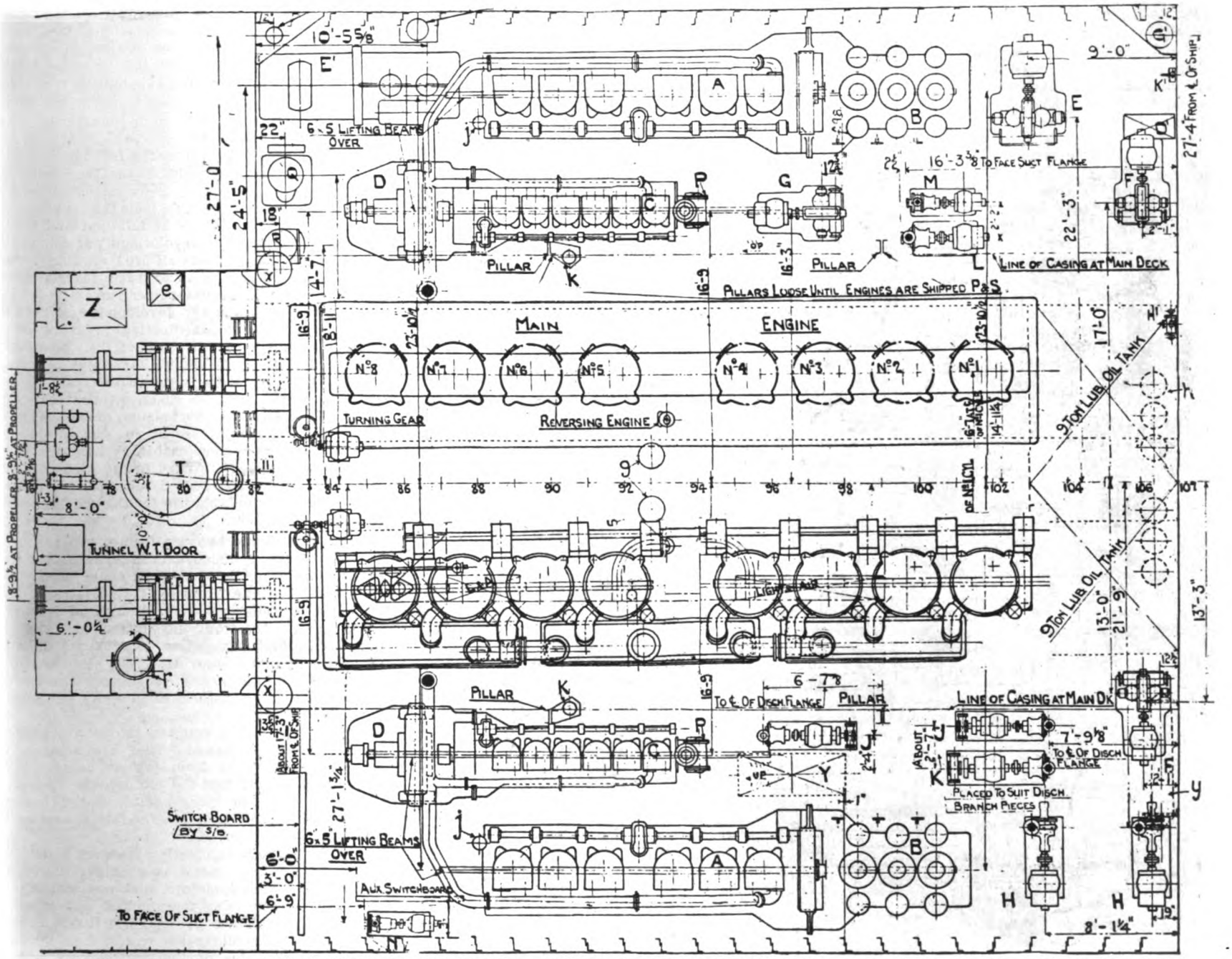
The high power of the auxiliary engines is due to the fact that all the crews and passenger accommodations will be electrically heated and to the air compressors being separately driven. Accommodations provided on the bridge and promenade decks for 100 first-class and 50 second-class passengers, the first in one, two and three berth-rooms and the second in two, three and four



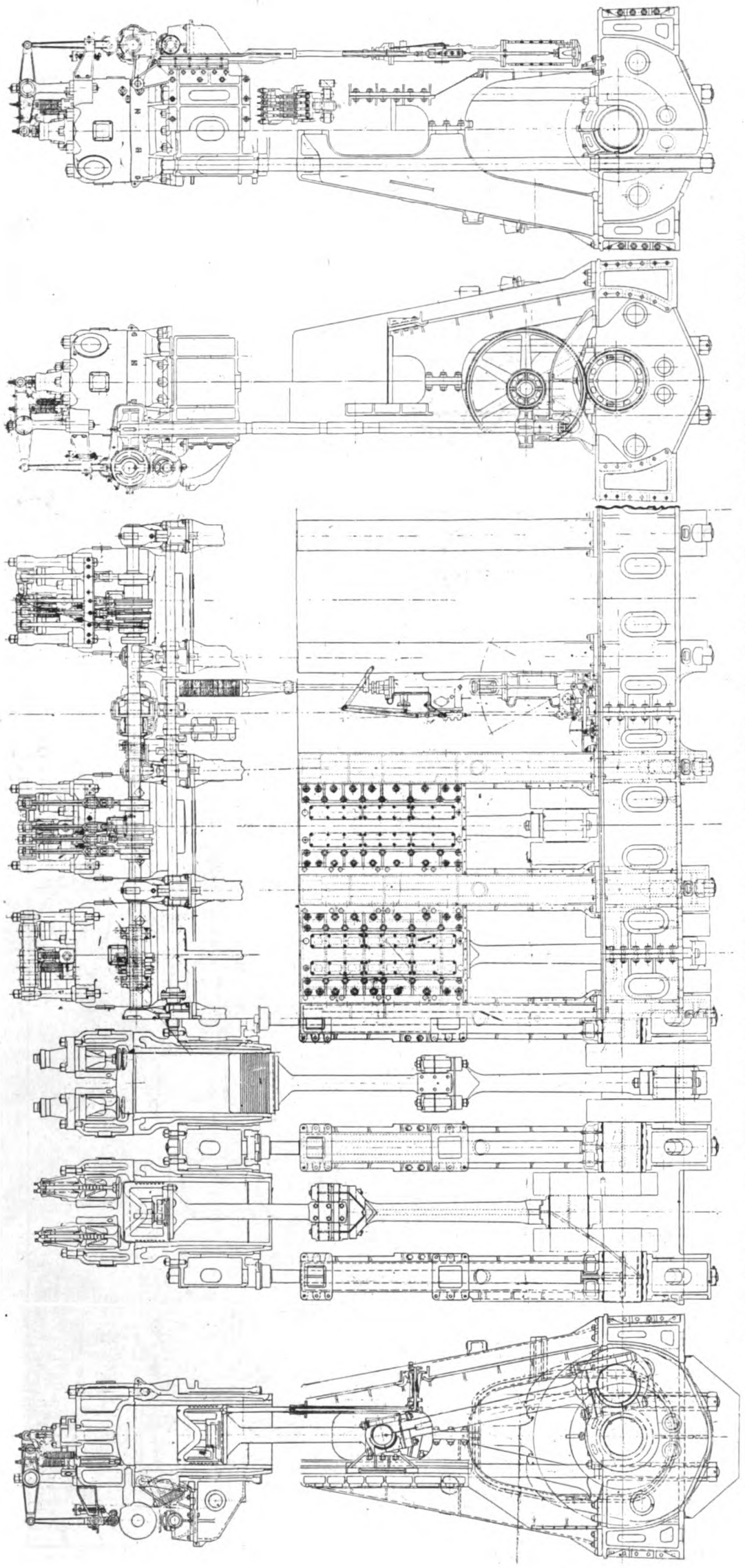
The twin 2,000 shaft h.p. North British Diesel-engines of the m.s. "Domala" on the test-bed, connected to Froude dynamometer



General arrangement plans of the motorship "Domala." Note the small machinery space.



Engine-room plan of the "Domala." There are two 400 b.h.p. auxiliary Diesel-engines driving three-stage air-compressors, and two 200 b.h.p. Diesel-engines connected to electric-generators. There are no air-compressors on the main engines



Sectional, general arrangement, and end view drawings of the 2,000 shaft h.p. North British Diesel-engines of the motorship "Domala"

berth-rooms. At the fore-end is the first-class dining saloon, while the second-class dining saloon is at the after end of the bridge between decks, with the kitchens and pantries on the same level between the two saloons.

In addition there are music-room, smoking-room and entrance-hall for the first-class passengers, and corresponding rooms for those of the second-class. Space in promenade on both boat and promenade decks are covered by permanent sun-decks. Excellent accommodation has been arranged for the captain, officers, engineers and crew. Cabins are also provided for 12 cadets and for two Marconi operators. There is also a ship's hospital, as a doctor will be carried.

There are six cargo-holds, and a very efficient cargo-working apparatus is fitted. At each cargo-hatch there are two derricks, each for four-ton lifts with electric-winches. There is a heavy derrick capable of lifting up the 30 tons fitted on the foremast, and another for lifting up 50 tons on the main mast. By means of deep girders and wide-spaced pillars the holds are left free and unobstructed for the storage of bulk cargo. Large coal storage chambers are provided, and these are kept cool by a Haslam refrigerating plant. The Hele-Shaw Martineau type of electric-steering-gear has been adopted.

A new feature aboard motorships is the installation of an electrically-driven disinfecting apparatus with connection to the passenger and crew spaces for disinfecting, and with connections for all cargo-space for fire extinguishing. For operating the water-tight bulk-head doors from the bridge a hydraulic system is fitted. All fuel is carried in the double-bottom forward, while the double-bottoms aft and the after-peak is used for fresh water. Exhaust-gases from the main auxiliary engines are carried up a large stack amidships, so that in general appearance there will be nothing to distinguish this vessel from the conventional combination-type steamer. One of the reasons for the installation of Diesel-engines in this large fleet of ships is the keenness and interest which Lord Inchcape has displayed in the development of the motorship.

Regarding the 7-days non-stop full-power run of the port main-engine, which took place from the 4th to the 11th of April, every satisfaction was given. At the end of the test the engine was manoeuvred several times at full-load and finally reduced in speed to 28 revolutions per minute, at which speed the cylinders all fired regularly. The table which we give is an average sample of the readings taken on the full-power run.

The brake horse-power developed was 2,008 at 98 r.p.m., with a mean-effective pressure of 99 pounds on a fuel-consumption of 0.42 pound per shaft h.p. hour. The engine has eight cylinders, 26½-in. bore by 47-in. piston-stroke, and is designed to operate at 95 r.p.m. on the four-cycle principle. It is of the short-piston, cross-head type, the cylinders being carried in an entablature mounted on box-section cast-iron A-frames. The bases of the frames are fixed to the girders of the bed-plates by studs and fitted bolts, the top flanges forming another entablature for the closing plates below the cylinders.

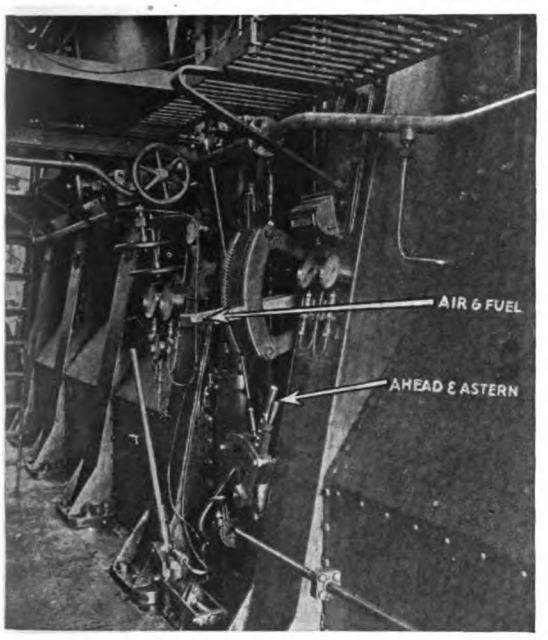
Long steel bolts, two per frame, are run from the top of the cylinder entablature through the frames down to the bed-plate cross girders to relieve the A-frames from logitudinal stress. The bed-plate is made in four sections and is of the usual form, with strong box-section fore and aft, carrying lateral box-section girders which form seats for the main-bearings. Of circular form, the main-bearings are of cast-steel lined with white-metal. The cross-head slippers are of the single-sided type.

Box-pistons with a concave crown are adopted and are sea-water cooled. They are arranged to be withdrawn either from top or below. It is interesting to note that the cooling-water supplied for the pistons is independent of the cooling-water for the cylinders; although sea-water is used for both purposes.

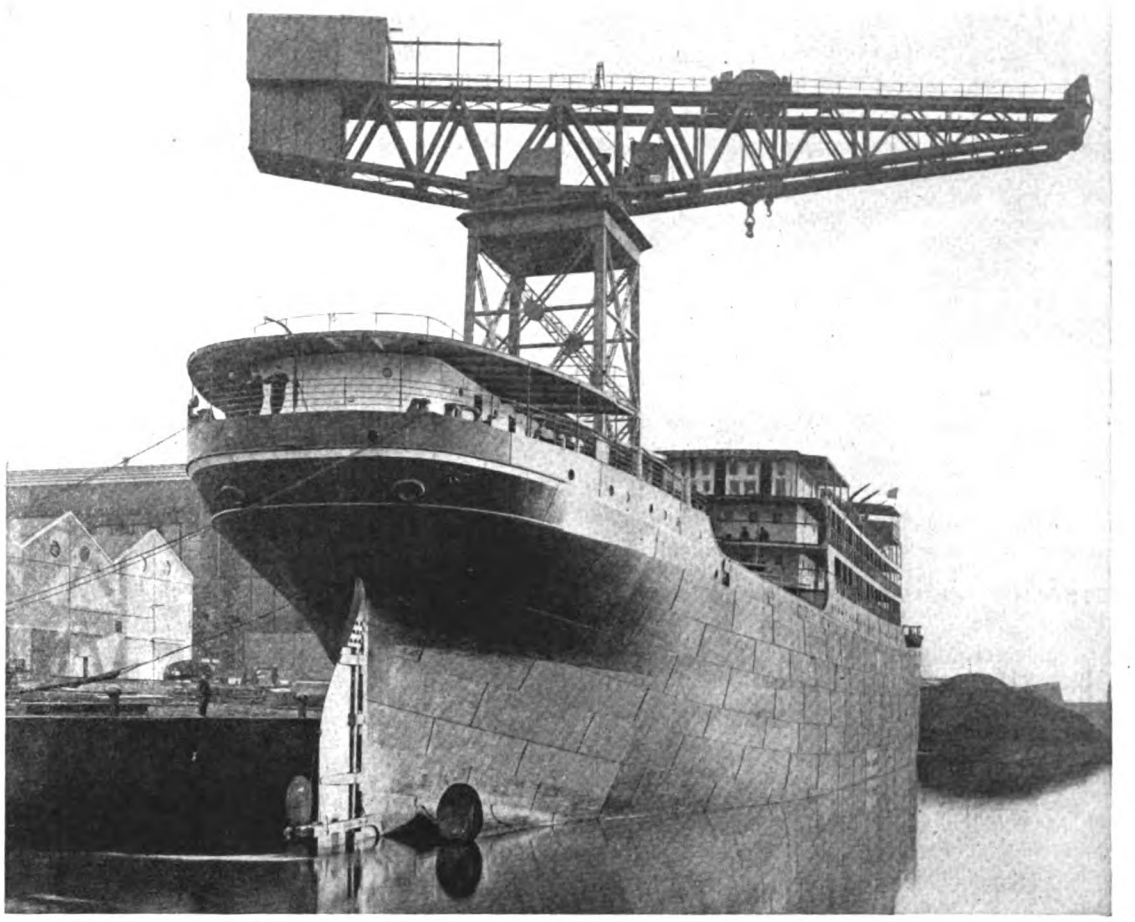
One of the most interesting features about this engine is that no air-compressors are driven directly by the main motors, and compressed air for fuel-injection--also for starting and manoeuvring—are furnished by two auxiliary Diesel-engines driving compressors arranged on the port and starboard sides of the engine-room respectively. These auxiliary Diesel-engines are six-

cylinder four-cycle sets of 400 b.h.p. driving three separate stage vertical air-compressors. Each set has sufficient capacity for serving both main engines at full-power, the other acting as a standby or for use when an unusual amount of manoeuvring has to be done.

In the case of similar engines now being built for a motorship owned by the Union Steamship Co. of New Zealand, the main air-compressors are driven off the crankshaft. The original reason of this was that the motorships for the British India Steam Navigation Company require a little more power. This was secured without increasing the size of the main engines, but by operating the compressors by auxiliary engines. However, it is noteworthy that additional benefit will be gained by taking the compressors away from the main engines, because the Union Steamship Company's vessels will be obliged to carry a full crankshaft as a spare, whereas if the air-compressors were independent they would only have to carry half-a-crankshaft, as in the case of the "Domala." In view of the power of the engines, a complete crankshaft is a costly and heavy fitting to carry.

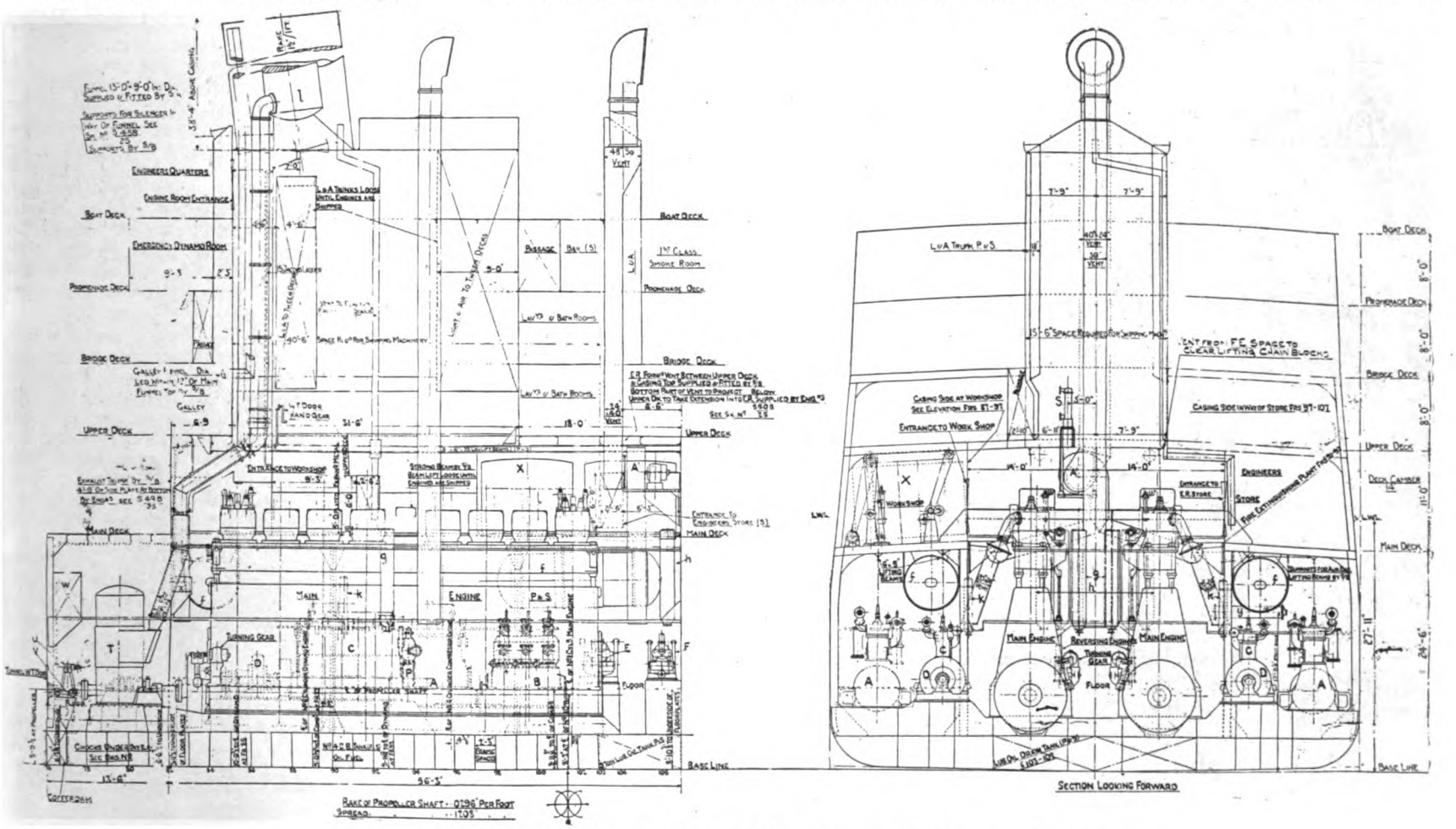


Control levers of North British engine



The motorship "Domala" under the North British Co.'s 150 tons crane having her 6,000 i.h.p. Diesel machinery installed

With regard to the valve-operating and manoeuvring-gear, it will be noticed from the drawings and illustrations that the camshaft is carried on brackets bolted on the cylinder entablature and the motion from the cam is transmitted to the valves by means of short steel push-rods and cast-steel rockers. Separate cast-iron cams are arranged for ahead and astern running, the same being brought into action respectively by lowering the camshaft, moving it endwise and raising it again. Owing to the drawings having only arrived at the time of closing this issue for press, we are unable to have these re-drawn in detail, so that this particular movement is not very clearly shown. Nor in the few hours available have we had the time to study the drawings for the purpose of giving a complete technical description, so it is our intention to publish a more detailed article of these interesting engines at an early date. Readings are given on next page.



Profile plan of engine-room and section looking forward, of the m.s. "Domala"

Main Engine—Typical Set of Readings Taken During Seven Days' Trial

FUEL OIL USED

Anglo Persian. Sp. Gravity, .895. Flash Point, 167° F. Vicosity, 302 4/5 Secs. at 61° F.

PARTICULARS OF ENGINE

Type: 8 Cyldr., 4-Cycle, S. A.
Bore: 26.5". Stroke, 47". Revs. 96 per min.
Stroke/Bore Ratio, 1.772.

LUBRICATING OIL USED

Main Brgs, Bottom Ends, Etc: Price's S/S 3255, Sp. Gravity .925.
Cylinders: Price's Oleogene, Sp. Gravity, .918.

Time of Observation	Revs. Per Min. Tachometer	Revs. Per Min. Counter	M. E. P. Cylinder I	II	III	IV	V	VI	VII	VIII	Mean M. E. P.	B. H. P.	Pressures—Lbs. Per Square Inch Blast Air	Starting Air	Lubricat'g Oil	Cylinder Cooling Water	Piston Cooling Water
2 P.M.	98	97.5	102.4	102.1	103.7	104.1	91	108.9	942.	93.4	99.1	2008	1000	250	15	17	42

Temperatures in Degs. Fahr.

Atmosphere	Crankcase	Circ. Water to Cyld. Guides	Piston Cooling Inlet	Brake Discharge	Piston Cooling Discharge	Guide Discharge	Exhaust Manifold Discharge	Cylinder Cooling Outlet I	II	III	IV	V	VI	VII	VIII	Lub. Oil Inlet	Lub. Oil Outlet	Mean Ex Gas Temp.	Fue Lbs. /HR	Fuel Lbs. /B.H.P. /HR
72°	88°	52°	52°	126.5°	144°	81°	151°	118°	118°	120°	118°	118°	118°	110°	110°	66°	96°	592°	845	.42

Air Compressor independently driven. Slow Speed Trial, 28 revs/min. Time for reversal from Ahd. to Astern, 11 seconds

MOTORSHIP "KENNECOTT" COMING TO NEW YORK

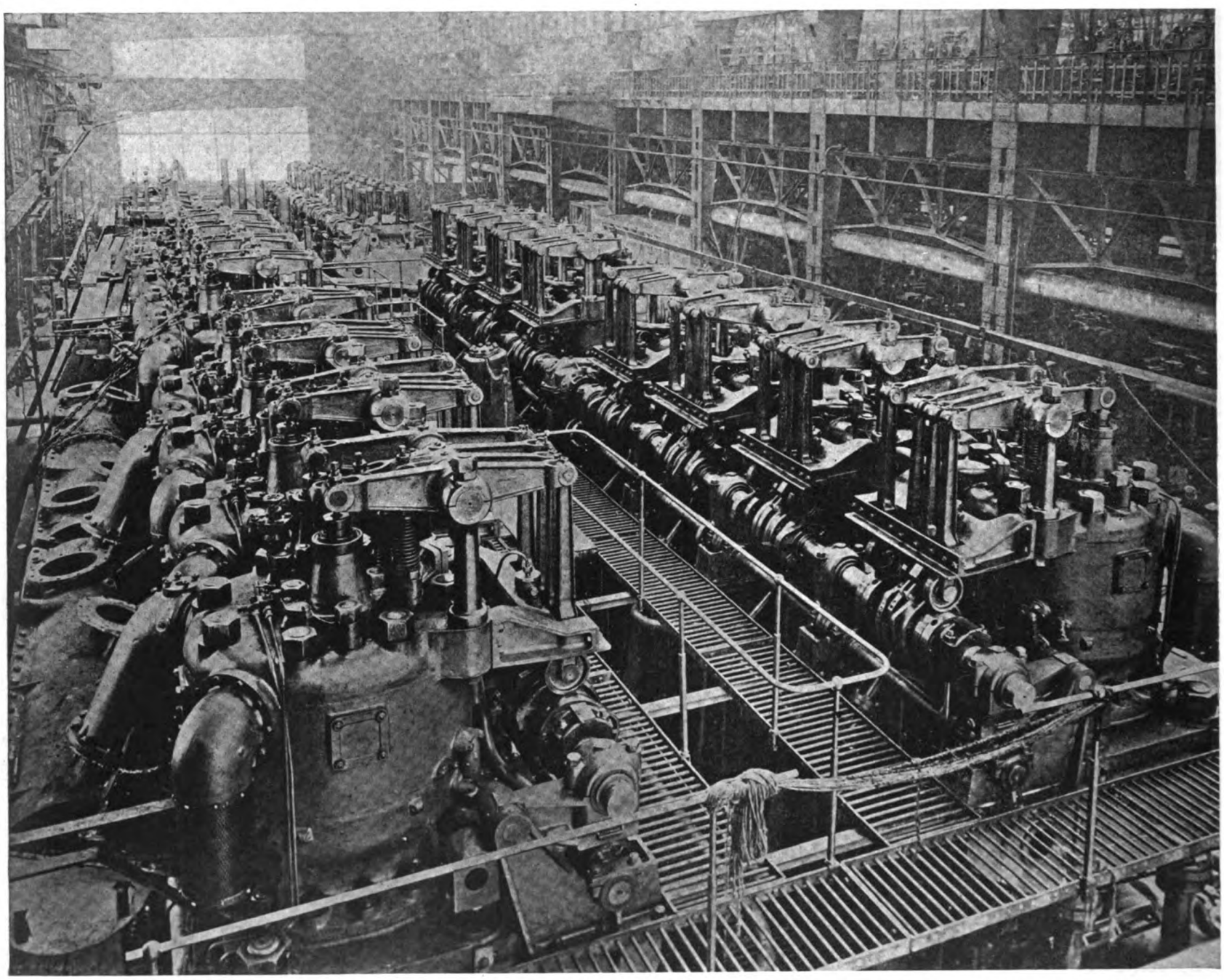
We understand that the new 6,000-ton motorship "Kennecott," owned by the Alaska Steamship Company, is now en route for New York. We suggest that shipowners visit this interesting all-American vessel when she arrives. She is in command of Capt. John Johnson. The "Kennecott" arrived in San Pedro on April 16 from Bellingham, with 3,500,000 ft. lumber, after a record voyage of 4 days, 5 hrs., the new engines running at overload all the time. She brings a full-cargo to New York.

TRIALS OF SINGLE-SCREW MOTORSHIP "SARDINIA"

Owing to very great pressure on our editorial space, we are obliged to hold over a description of the trials of the new single-screw Werkspoor Diesel-engined motorship, "Sardinia," built in Holland to the order of the Otto Thoresen Steamship Line. She is a vessel of 3,000 metric tons d.w.c. propelled by a six-cylinder four-cycle engine of 1,950 i.h.p. (1,500 shaft h.p.), and is the first of the Werkspoor engines of this power to be fitted in a ship.

DETONATION OF INTERNAL-COMBUSTION ENGINES

On April 15th a very interesting paper on the "Detonation of Internal-Combustion Engines" was read by Mr. H. T. Tizard before the North East Coast Institution of Engineers and Shipbuilders, Bolbeck Hall, Newcastle-on-Tyne, England. Owing to the mass of editorial matter on hand, we are unable to publish an extract in this issue. However, copy can be obtained by communicating with the secretary of said address.



View of erecting-shop of the North British Diesel Engine Works showing a number of high-powered marine Diesel-engines under construction

Motor-Tug of Unusual Design

"Percheron" a Winton Diesel-Electric Tow-Boat of the Hullfin Type for New York State Canal Service

THOSE of our readers who are interestedly following "Motorship's" series of articles on the New York State Canal, will also be interested in a new type of motor-tug that has been designed on Captain Golden's "hullfin" principle by C. V. S. Wyckoff of New York to the order of Capt. R. E. Pretty of the Hudson Towboat Co., Hoboken, N. J., for towing service between New York and Buffalo on the Hudson River and New York State Canal. We understand that the contract for building the hull is being placed with the Brooklyn Dry Dock Co. and Repair Corporation, and that the twin Diesel-engines will be supplied by the Winton Engine Works.

An unusual feature of this craft, which had been tentatively named "Percheron," is the arrangement for Diesel-electric drive, and the design shows the main engines coupled to two 90 k.w. Westinghouse generators, these developing direct-current for two 100-125 b.h.p. Westinghouse electric-motors direct-connected on the twin propeller-shafts. Each of the six-cylinder four-cycle Diesel-engines develops 150 b.h.p. at 450 r.p.m.

Reference to the design of this vessel will show that the hull is shoal-draft along easy diagonal lines, but has a section, termed "fin," projecting below the hull in which the electric-propelling-motors are placed—the Diesel-engines and generators, as well as the auxiliary machinery, being in the engine-room above.

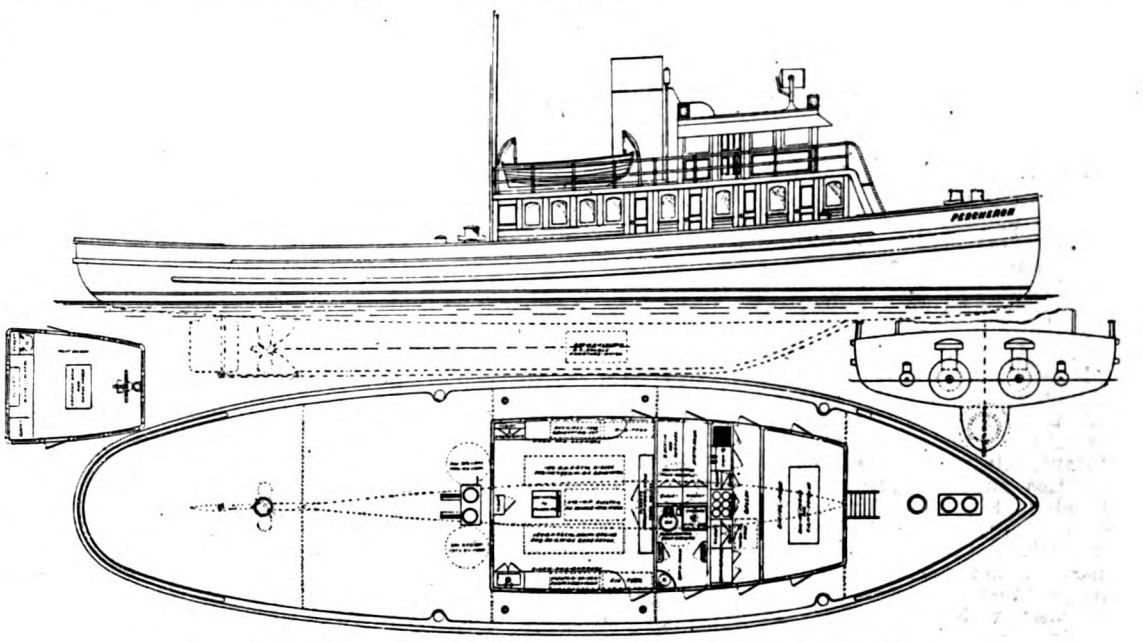
The craft has the following dimensions:

Length (O. A.)	96 ft.
Length (W. L.)	93 ft.
Breadth (M.D.)	26 ft. 6 in.
Extreme draught	7 ft. 9 in.
Diam. of propellers	5 ft.
Displacement	75 tons (short)
Weight of power plant	33 tons (short)
Power of Diesel engines	300 b.h.p.
Shaft h.p. (normal)	200 h.p.
Shaft h.p. (maximum)	240 h.p.
Propeller speed	200 to 500 r.p.m.
Fuel-tank capacity	2,400 gals.

Many broad claims are made by the designers for this special hull design, and it will be interesting to see if all or most of the anticipated benefits result in actual practice. Above the water-line the boat does not depart much from recognized practice, except that she has unusually clean-cut above-water lines, and when afloat should make quite an attractive looking tug.

Claim is made for remarkable propeller efficiency, due to a clear flow of water to the propellers allowed by the fin. In fact, we are advised that 200 shaft h.p. (240 engine b.h.p.) is approximately 80% more efficient than it would be in an orthodox hull, and so is equivalent to 360 b.h.p. (or 450 steam i.h.p.) in ordinary tow-boat practice. Furthermore, the design is said to offer unusual maneuvering ability, with freedom from bottom suction, the latter being very important in canal navigation or other shoal water. Then again the high stabilizing efficiency and lateral resistance said to accompany the hull-fin form of construction, eliminates the pounding incidental to the average wide-bottom shallow-water boat. Easy lines, increased accommodation area, reduced displacement and machinery weights are produced, rendering the design superior for sea-going and general towing service.

A high propeller-speed has been adopted for this vessel on the basis that diameter and revolution rules in common use are not relative, and that a small wheel of proper pitch and blade area with high revolutions will tow or drive as effectively as a larger wheel with fewer revolutions. In this boat the propeller is located well forward of the stern, functioning in almost 100% solid water with the idea of securing maximum efficiency at any speed.

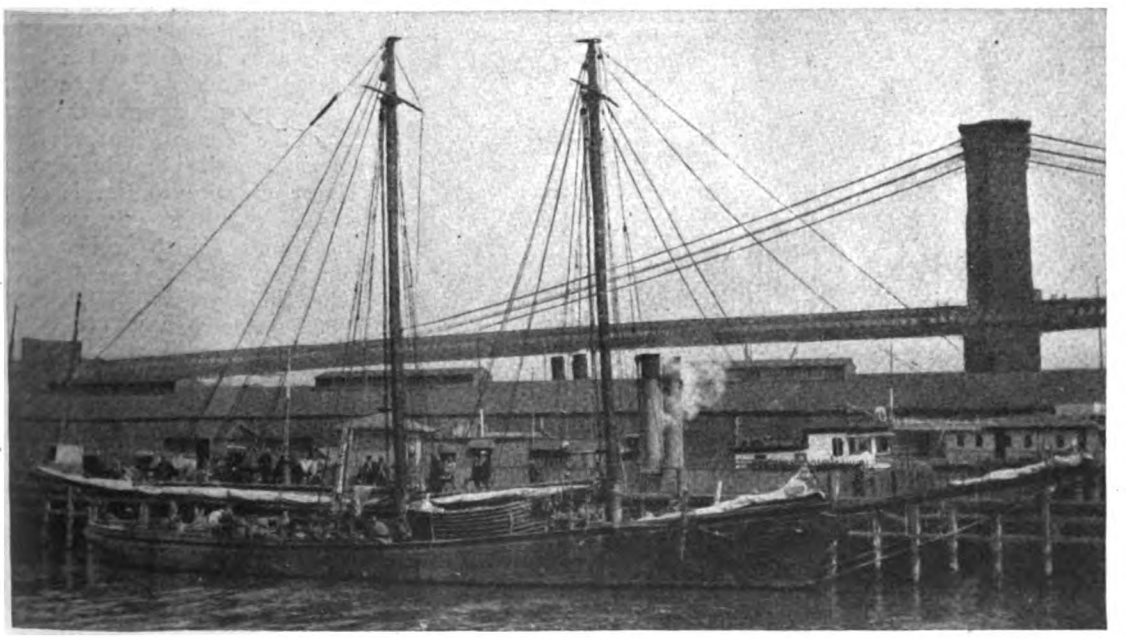


Hullfin-type tug to be built for service on New York State Canal

Modernizing an Old Fishing Vessel

While not of any unusual nature an interesting installation of a Bolinders heavy-oil engine is that recently completed in the case of the old auxiliary gasoline-engine driven fishing-schooner, the "Ruth M. Martin," owned by Chesebro Bros. of No. 1 Fulton Fish Market, New York City, a subsidiary of the Atlantic Coast Fisheries Company with executive offices at 16 Exchange Place.

The "Ruth M. Martin" was built at Essex, Mass., in 1892, and measures 98 gross tons and 43 net tons being of the following principal dimensions: Length 89.2 feet, breadth 23.7 feet, with a depth of 9.8 feet. While originally a two-masted schooner with top sails she has for the last eight or ten years had an auxiliary gasoline engine as a "kicker" and is now stripped of her top sails.



Auxiliary fishing-schooner "Ruth M. Martin," Chesebro Bros., New York, recently equipped with a 100 b.h.p. Bolinders oil-engine. Speed without sails, 8½ knots.

After having been re-engined at the Tebo Yacht Basin, foot of 23rd Street, Brooklyn, N. Y., with the new two-cylinder, direct-reversible engine developing at normal load 100 b.h.p. she set out on Thursday, March 24th, on her first fishing trip for the season having a crew of 17 men commanded by Captain Tobias Johnson, when a speed of some 8½ knots was attained, without sails, being driven by a three-bladed 48 in. by 42 in. bronze propeller at about 325 r.p.m.

The engine-room while naturally not of a very spacious nature accommodates besides the engine three 200-gallon fuel-tanks and one 200-gallon fresh-water tank. While automatically charged by the engine the air bottle may in an emergency be loaded by a two stage hand air compressor which is provided.

The 100 b.h.p. Bolinder engine of the "Martin" while of standard design is not the very latest type of engines that the Bolinders Company are going to market here through their Branch Office at 30 Church Street, for in their latest design just announced both water and air injections are dispensed with, substituted by a new fuel injection device and a new method of obtaining a more efficient combustion of the fuel in the cylinders tending to increase the power of the engine at a still lower consumption of fuel than with the "Martin" engine which latter, however, is guaranteed not to consume more than a fraction over half-a-pound of fuel-oil per brake horse-power hour.

PROPELLERS OF THE MOTORSHIP "BACOI"

In our last issue it was stated that the new bronze propellers of the "Bacoi" were made at W. & A. Fletcher's plant. However, they were made at the Vulcan Iron Works, but were designed by Mr. Ebsen of the Fletcher Co., in conjunction with the Vulcan Iron Works.

MOTORSHIP

Trade Mark, Registered

Published Monthly in the Interests of Commercial and Naval Motor Vessels and for Recording International Progress of the Marine Internal-Combustion-Engine

Head Office: 1270 BROADWAY, NEW YORK, N. Y.

149 California Street, San Francisco 71 Columbia Street, Seattle, Wash.

Cable Address—Freemote New York

Copies of "Motorship" can be secured from the Atlas Publishing and Distributing Co., London; from Smith and Wyman's railway bookstalls in Great Britain; also from Julius Springer of Berlin.

Published by MILLER FREEMAN & COMPANY

MILLER FREEMAN.....President

THOS. ORCHARD LISLE.....Editor
A. M. S. Naval Engineers. A. M. I. Marine Engineers

RUSSELL PALMER.....Manager

Subscription rates: U.S.A. and Mexico, $3.00 per year. Germany, 300 marks. Canada and foreign countries in the postal union, $3.50. Single copies, United States, 25c. Great Britain, 1/6. Other countries, 35c.

"Motorship" is published on the 25th of the month prior to date of issue, and all changes in and new copies for advertising must be in the hands of the publisher prior to the 5th of each month. Notice of discontinuance of advertising must be given before the 1st of the month, preceding issuance.

PRESIDENT HARDING AND THE MERCANTILE-MARINE

Every assurance that President Harding will stand at the back of the American merchant-marine was given in his address before the Senate at the opening of the Congressional session. Dealing with the subject of transportation and maritime commerce, he said:

"Linked with rail and highway is the problem of water transportation—inland, coastwise and transoceanic. It is not possible, on this occasion, to suggest to Congress the additional legislation needful to meet the aspirations of our people for a merchant-marine. In the emergency of war we have constructed a tonnage equaling our largest expectations. Its war cost must be discounted to the actual values of peace, and the large difference charged to the war emergency, and *the pressing task is to turn our assets in tonnage to an agency of commerce.*

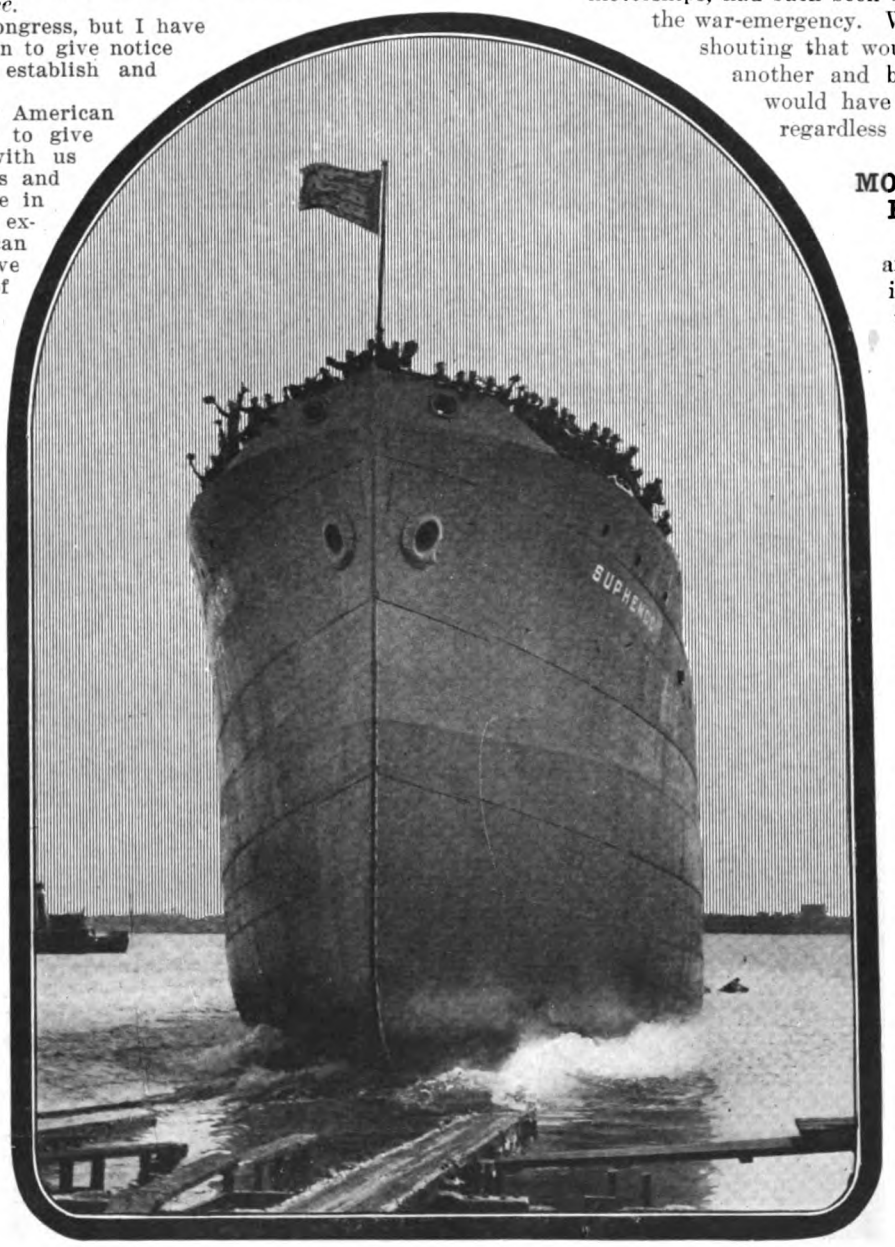
"It is not necessary to say it to Congress, but I have thought this to be a befitting occasion to give notice that the United States means to establish and maintain a great merchant-marine.

"Manifestly if our laws governing American activities on the seas are such as to give advantage to those who compete with us for the carrying of our own cargoes and those which ought naturally to come in American bottoms through trade exchanges, then the spirit of American fair play will assert itself to give American carriers their equality of opportunity.

"This republic can never realize its righteous aspirations in commerce, can never be worthy the traditions of the early days of the expanding republic, until the millions of tons of shipping which we now possess are co-ordinated with our inland transportation and our shipping has Government encouragement, not Government operation, in carrying our cargoes under our flag, over regularly operated routes, to every market in the world, because carrying is second only to production in establishing and maintaining the flow of commerce to which we rightfully aspire."

President Harding makes it clear that no matter if costly, the new Government will back the merchant-marine to a sufficient extent to ensure its success. A big problem is before the new Shipping Board in turning the present "war emergency" fleet to practical commercial vessels that can compete against the vessels of all nations without, if possible, permanent federal subsidies. We can echo the President's words in that—"the pressing task is to turn our assets in tonnage to an agency of commerce."

Undoubtedly, many of the existing freighters, passenger-vessels and tankers must have their existing uneconomical and inefficient propelling and auxiliary machinery removed and replaced with equipment of the most modern type in order that they may take their proper place on the high seas, and it will be necessary for Congress to appropriate some money for this purpose before these vessels can be turned over to private ownership. We feel absolutely sure that there are at least 100 steel ships laid-up that will never again go to sea in their present condition. With these craft direct-Diesel, or Diesel-electric power is the only solution.



ANOTHER STEP IN THE FULFILMENT OF PROGRESS
Launch of the Submarine Boat Corporation's first motorship, the "Suphenco." She is to be propelled by a six-cylinder 2240 i.h.p. Craig four-cycle Diesel-engine

REDUCTION-GEARS FOR MOTORSHIP WORK

Referring to the article on the operation of the Diesel-engined motorship "Libby Maine" published in our March issue, this vessel is noteworthy in that her main engines drive the propellers through reduction-gears. The owners of this vessel would form a valuable service if they would take careful measurements of the wear of the reduction-gears and also issue a general report regarding their operation. This would come at a time when the subject is alive, because of the two large Diesel-motor freighters now building in Germany for the Hamburg-America Line with which high-powered submarine engines in conjunction with reduction-gears are being used as propelling machinery.

SUPPOSING THEY HAD BEEN DIESEL-ENGINED MOTORSHIPS!

According to a report in one of the weekly marine-journals 40 geared-turbine ships built at one shipyard have to be overhauled, which work will include the relining of the turbines and gears due to faulty lay-out. The first of these vessels has already been dry-docked for that purpose, including rebuilding and will take a month—after which a decision will be arrived at as to what will be the best methods to put the other ships into shape. In one ship the gears have been stripped and new gears have already been put in. The marine publication in question goes on to say that certain modifications were made to the propelling-machinery and later ships have been more or less successful.

It is to be noted that all this has been going on very quietly and details have not appeared in the technical press. We wonder if that would have been the case if trouble to similar extent had developed to forty new Diesel motorships, had such been built by the Shipping Board during the war-emergency. We can well imagine the tremendous shouting that would have gone up from one coast to another and back again. In fact Diesel power would have been damned forever in America, regardless of its economy.

MOTORSHIP "ZOPPOT" TOWS BIG DISABLED STEAMER

In our issue of Sept., 1920, details and illustrations were given concerning the maiden voyage of the 17,000 tons d.w.c. German Diesel motor tankship "Zoppot." This vessel recently again crossed the Atlantic to New York. On this voyage she towed the 13,000 tons steamship "Baltic" a distance of 878 miles to the Azores at a speed varying from 6 to 7 knots. The steamer "Baltic" had become disabled owing to leaky boilers and clogged oil-burning system. This incident is exceedingly interesting for many reasons which need not be dwelled upon here, as they are so obvious.

An 8 inch cable was used for towing the "Baltic" and a break occurred to this cable at a point where it passed through the stern choc of the "Zoppot," but was satisfactorily remedied by winding with a layer of wire and a layer of hemp rope on top. It was then spliced to a 7 inch cable coming from the "Baltic" via a 60-meter anchor-chain giving a total length of 800 meters between the ships. At no time was the end of the "Zoppot's" cable visible and during the passage through relatively shallow waters it dragged on the bottom as indicated by abrasions. The towing work was transferred to another vessel as the "Zoppot" was light and was running short of fuel, not having anticipated the tow—otherwise she would have had ample fuel to have made the United States. During the run her engines functioned perfectly.

An American Oil Company's Motorship Fleet

Operation of Texas Company's Nine Oil-Engined Vessels

By L. B. JACKSON*, M. E.

*Member—American Soc. of Mach. Engrs.; Soc. Naval Atch. & M. E.; Diesel Eng. Users Asso. (England.)

NINE vessels propelled by oil-engines are now in the service of The Texas Company which is well-known as one of the big independent oil-companies. Seven of these vessels have the Diesel-type of engine and two have the surface-ignition type of engine. Of the Diesel-engined vessels two are twin-screw, therefore eleven oil-engines in all are used for propelling purposes. In addition to these engines twenty-one surface-ignition type oil-engines are used for auxiliary purposes such as driving electric-generators, air-compressors and pumps.

The first installation was started in April, 1916, when two engines were installed in the five-masted schooner "Kineo," which was renamed "Maryland." She has the following dimensions:

Length	259' 5"
Beam	45' 3"
Depth	22' 9"
Gross Tons	2498

The engine-room installation consisted of twin 320 b.h.p. "hot-bulb" type of surface-ignition engines of foreign manufacture; 1 Auxiliary set with a 15 HP Fairbanks Morse oil-engine direct-connected to a 10 K. W., 115v. D. C. electric generator and with clutch connection to a 250 lb. air-compressor; also a 5 H. P. electric motor-driven 5" x 6" fire and bilge pump. At the same time an oil-fired donkey-boiler, a steam steering-gear and two steam winches were installed.

When the installation was completed the "Maryland" went into the South American trade carrying the owner's products to that country and bringing back coffee or linseed or available cargo. Oil-engines were not very common in America at that time and very often it was found that the engineers in charge did not thoroughly understand the operation and maintenance of the machinery in their care. This resulted in frequent and expensive delays; furthermore engines manufactured abroad were built on the metric system and used Whitworth threads, which increased time necessary for repairs. Due to the war it was often impossible to secure repair parts and this made it necessary to make patterns, cast the same and machine to foreign measurement standards, a very slow and expensive proposition.

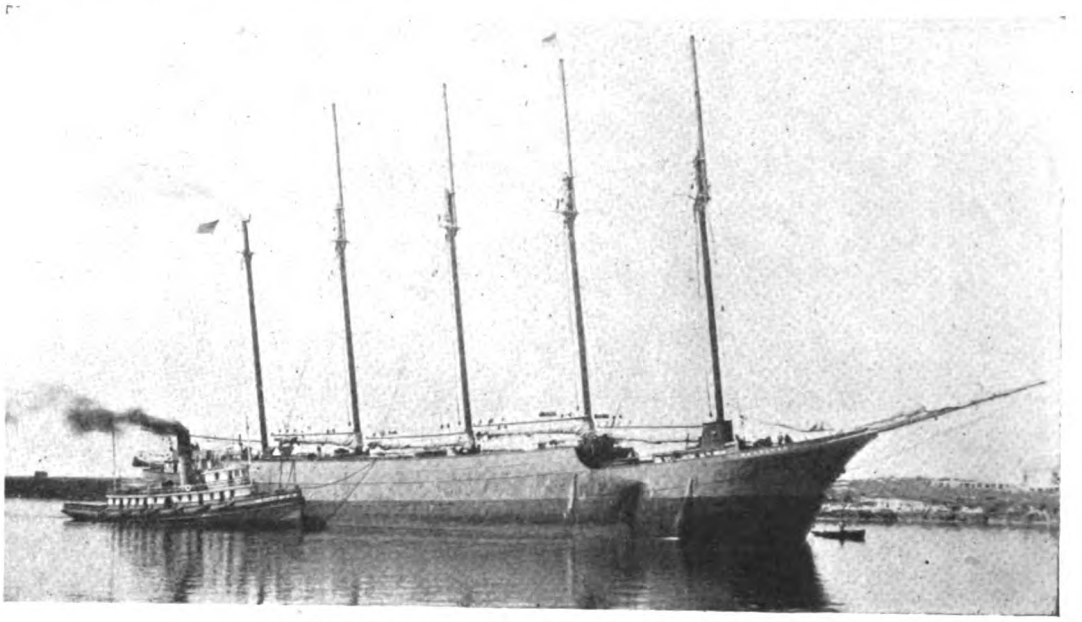
Owing to above difficulties and also to better fuel economy possible with the Diesel-type engine, it was decided that it would be advisable to replace the original engines with Diesel-engines of American manufacture.

In January 1919 the "Maryland" went into service again, in the South American trade. The machinery installation in the engine-room consisted of:

Twin 300 b.h.p. McIntosh Seymour Diesel-engines.

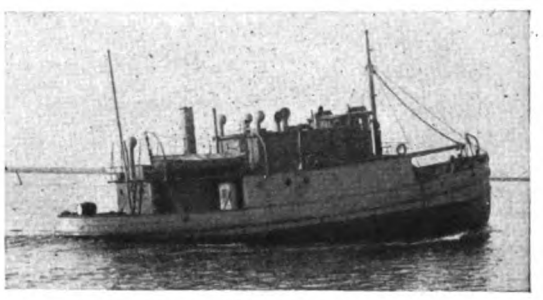
Auxiliary set, as follows:

1-30 b. h. p. Fairbanks Morse "C-O" oil-engine
1-15 K. W. 125v. Electro-Dynamic Co. generator
1-92 cu. ft. 1200 lb. Craig Air-Compressor



Texas Co.'s motor-vessel "Maryland."

1-7½ H. P. motor-driven centrifugal circulating-pump
1-5 H. P. motor-driven 5" x 6" fire and bilge pump



"Texaco 125."

1-6" x 6" x 6" steam auxiliary circulating pump
1-96 cell A-4-H Edison Storage battery

Since the installation of these engines there has been practically no engine trouble and the consumption of fuel and lubricating-oil has been greatly reduced. Though the total propelling power is but 600 b.h.p. the vessel makes an average speed of 6½ knots loaded and 7 knots light on a daily fuel-consumption of 25 bbls. (including donkey-boilers and auxiliary set).

The Power Lighters "Alma R" and "Emma R" were completed May 28, 1917, at the shipyard of The Texas Steamship Co. at Bath, Me. These boats have the following dimensions:

Length O. A.	90' 0"
Beam	17' 0"
Draft	4' 5"
D. W. Tons	73

They are both propelled by a three cylinder 10½ in. x 12½ in. "CO" Fairbanks Morse oil-engine equipped with reversing clutch. Having but one hold which is 26 ft. long x 17 in. wide x 5 in. deep, they are particularly adapted for the carrying of pipe and general supplies used in the oil fields. After a few hours trial run in the Kennebec River they proceeded under their own power to Tampico, Mexico, reaching there without any trouble or mishaps. Since their arrival there, about three years ago, they have been in continuous service, manned with a Mexican crew, and giving complete satisfaction.

During January and February, 1918, two more Diesel-engined vessels, "Texaco 124" and "Texaco 125" were completed at the shipyard in Bath, Me. Both were designed for harbor and bay service for delivering gasoline and kerosene in bulk.

The following table gives a brief description:

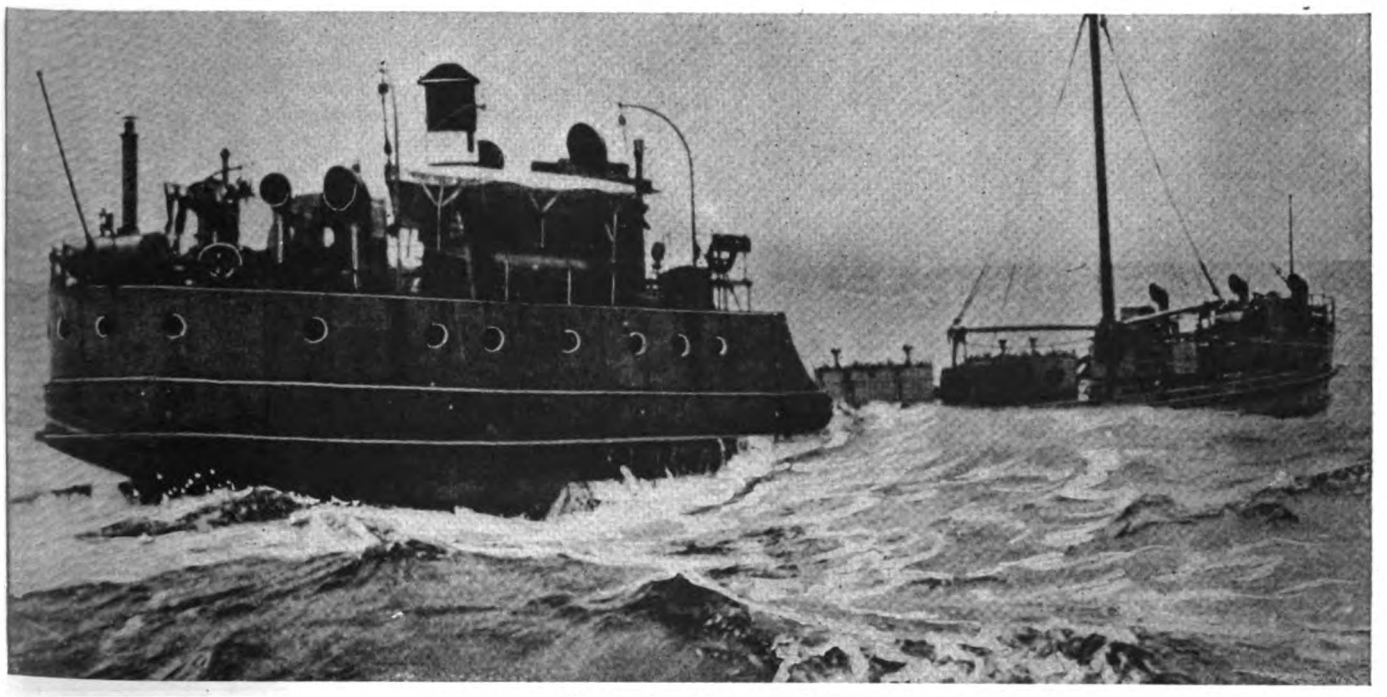
Length O. A.....101' 0"
Beam ..... 23' 0"
Depth ..... 11' 0"
Cargo-Capacity, 71,400 gals.
Main Engine, Craig Diesel

6-cylinder, 4-cycle, 12½" x 15", 250 b.h.p.
Auxiliaries—

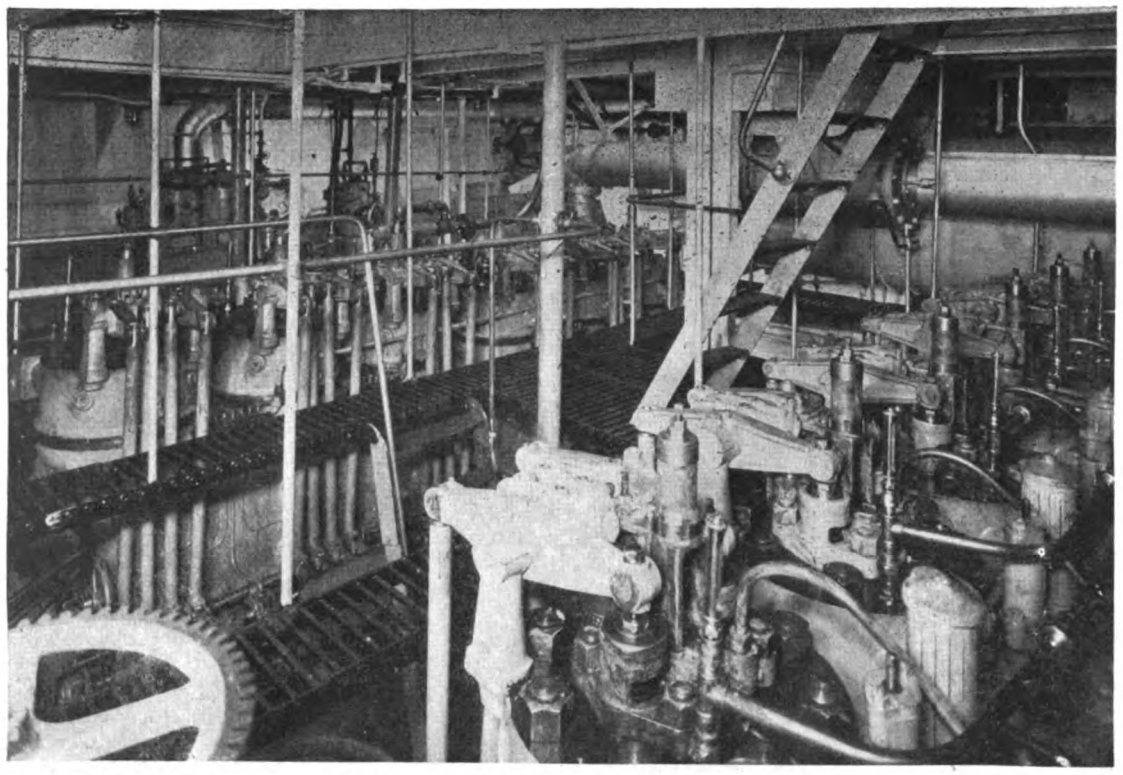
Craig gasoline engine, compressor, electric generator-set.

30 H. P. "CO" Fairbank Morse oil-engine driving three cargo-pumps.

The next motor-vessels completed at the shipyard were the "Texaco 145," "Texaco 146" and "Texaco 147," which went into service in the above order, during May, June and July, 1919. As far as the hulls



The tanker "Texaco 146"



Engine-room of m. s. "Maryland," showing twin McIntosh & Seymour Diesel-engines.

gines have proven to be very reliable in operation, repairs have been negligible and fuel and lubricating-oil consumption has been up to expectations. These boats average 8 to 8½ knots on a fuel-consumption of 10 to 11 barrels per day. As an example of their reliability it should be noted that one of these boats in the first year of service was laid up only nine days on account of overhauling machinery.

The last motor-vessel to be completed was the M. V. "Solitaire" which went into commission April 17, 1920. Although the deadweight capacity is 4,600 tons and the b.h.p. but 1,000. yet the average speed for the nine months ending January 17, 1921, was 8.97 knots and the average fuel-consumption (for all purposes) was 0.38 lb. per I. H. P. or about 0.35 lb. per I. H. P. for main engines alone. The lubricating-oil consumption for all purposes, for the same period averaged 9½ gals. per day.

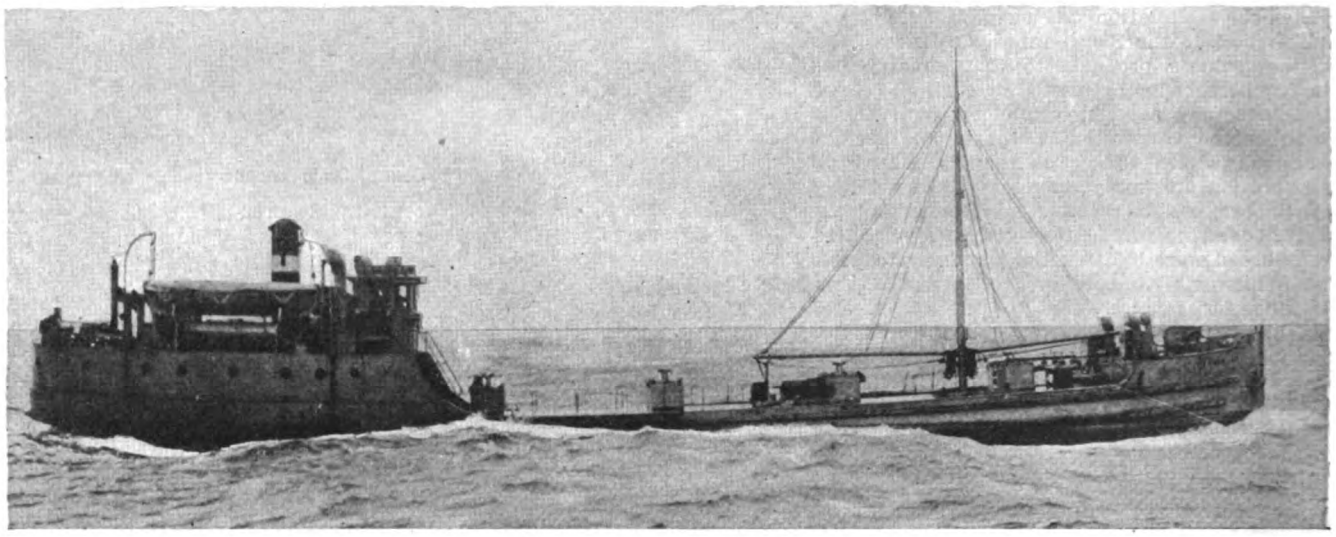
Six different types of engines have been installed in ten sizes varying from fifteen horsepower auxiliary engines to five hundred horsepower propelling-engines. The installations have been made in five different types of vessels varying from inland lighters and harbor tankers to a full-powered sea-going motorship. As a result considerable experience and knowledge has been obtained not only in regard to different types of engines operated under different conditions, but also as to suitability of the various types for certain services.

and auxiliaries are concerned these vessels are exact duplicates: "Texaco 145" has a 400 b.h.p. Craig Diesel-engine whereas the other two each have a 300 b.h.p. McIntosh & Seymour Diesel-engine. All three are miniature tankers for refined petroleum products and so constructed as to be suitable for coastwise or inland service.

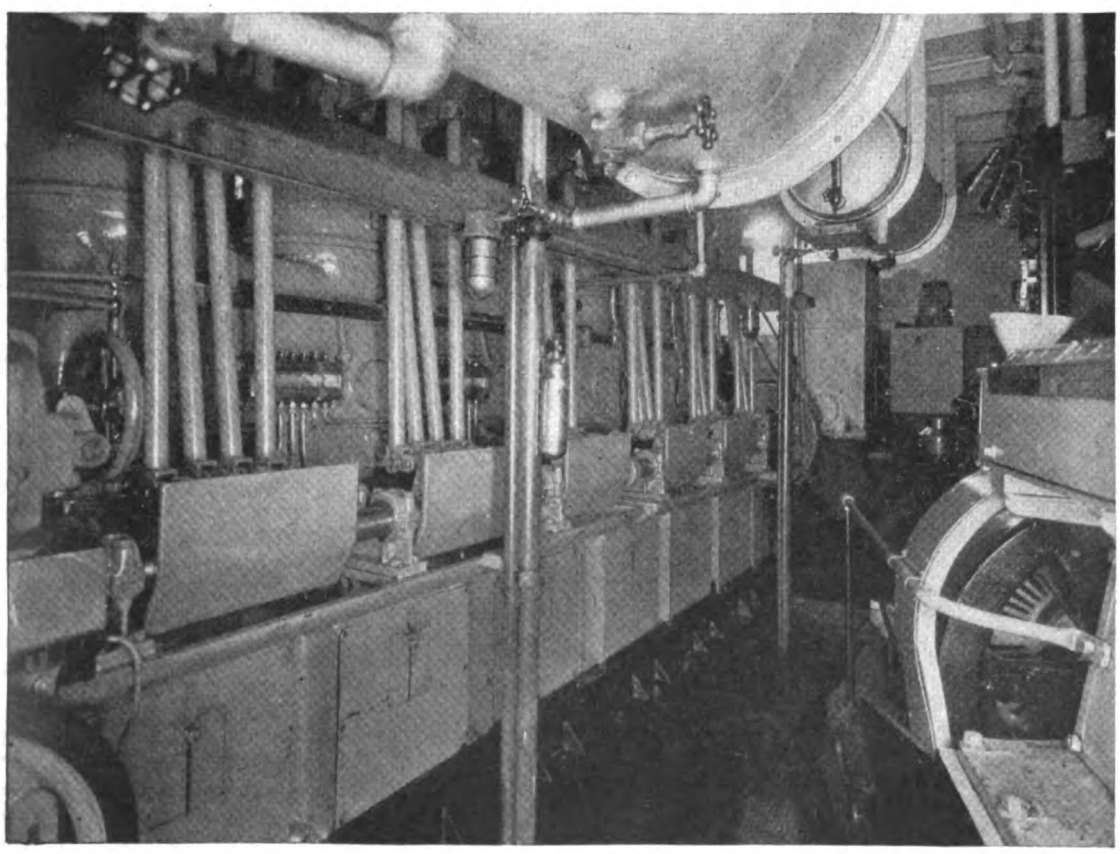
Principal Dimensions:

Length..... 152′ 11″
Beam..... 30′ 0″
Depth..... 12′ 6″
Cargo-Capacity, 5,980 bbls.

Results to date have been most satisfactory; the en-



The tanker "Texaco 145"



300 b.h.p. McIntosh & Seymour Diesel engine in engine-room of "Texaco 146."

As a result of experience gained in connection with the operation of these vessels the writer has formed a few general conclusions which probably have been verified by the experience of others. The idea that the Diesel-engine is complicated, also that an accuracy of workmanship hard to obtain is required in their manufacture, is a fallacy. With the possible exception of fuel-pumps and atomizers there is no work but which any ordinary good machine shop is capable of handling; a heavy construction, in general, being more important than super-fine workmanship.

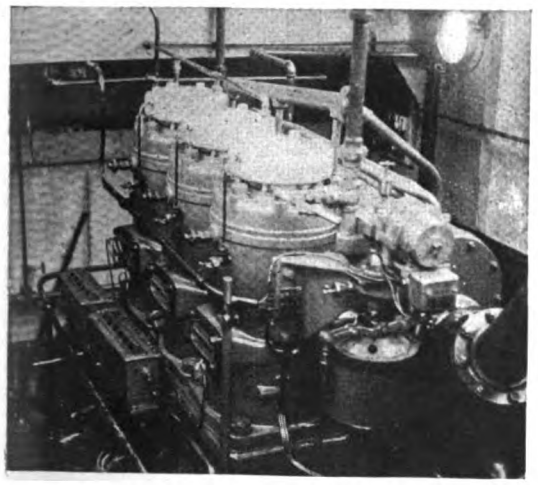
In regard to the open-type construction versus the closed-type of construction it is possible to have an engine of open-type construction which may have certain important parts less accessible than the same parts in an engine of the closed type. In other words more consideration should be given to the accessibility of cams, fuel-pumps and compressor-valves than to whether engine is of the open or closed type.

Another point that merits most careful consideration is the lubricating system. The heavy-oil used for lubrication Diesel-engines will not, in cold weather, flow freely with wick lubrication and unless continually watched and assisted by hand oiling an engine with this type of lubrication is likely to have considerable trouble with hot bearings. Where force-feed lubricators are used the viscosity of the oil in winter need not be considered, engineers are freed from this worry and bearing repairs practically eliminated. It is very important also that the lubricating system should be so designed that the oil will not become contaminated by fuel-oil leaking from the engine fuel-

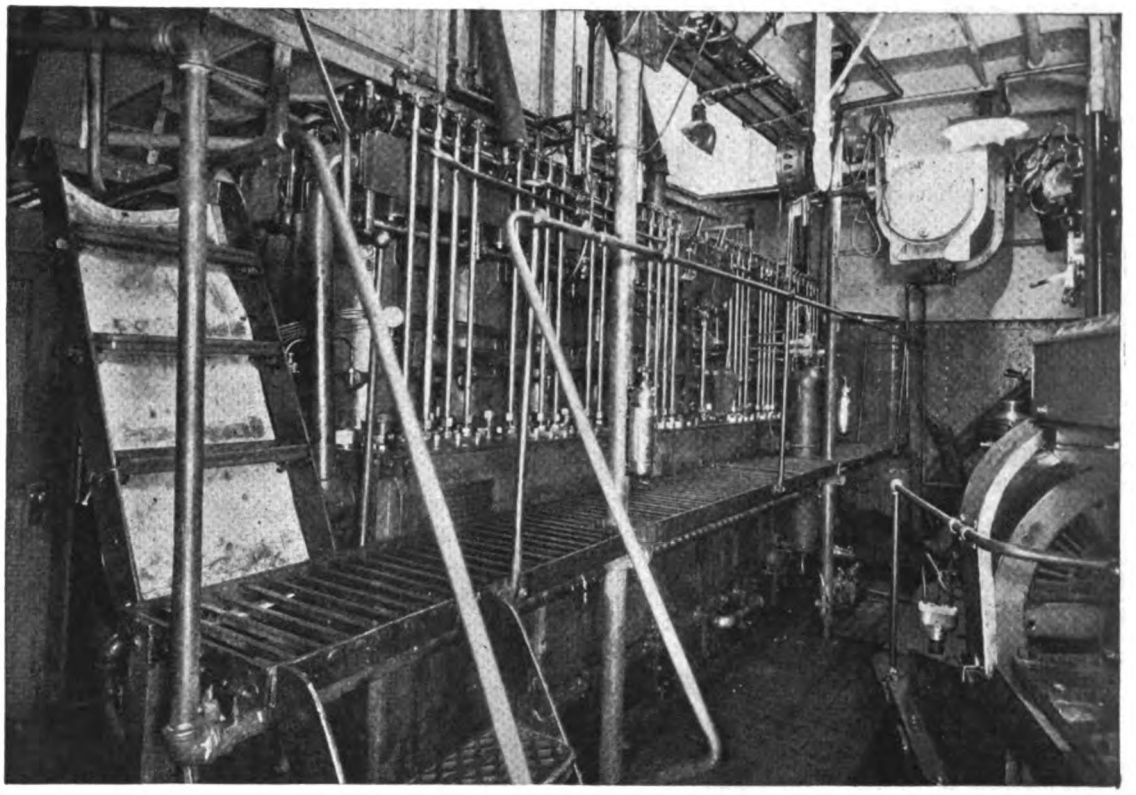
The "Alma R."

pump, or from salt water in case of a leak in the cooling system.

With engines in which but one fuel-pump is used the unit is larger and more rugged also more simple. These advantages however are more than offset by the fact that if this pump fails to function, or if there is a leak in any part of the system, the engine shuts down. In an installation where there is an individual pumping unit for each cylinder the engine can be kept running if two or three units fail.



Engine-room of "Alma R."



400 b.h.p. Craig Diesel-engine in the "Texaco 145"

Our experience to date proves conclusively that there is no basis in fact to warrant the statement that a Diesel-type engine is superior to the surface-ignition type of oil-engine for all purposes. In vessels in which the propelling-engine is not 300 b.h.p. or over, and where the trips are, on the average 24 hours or less, such as vessels used for sounds, harbors and rivers, the fuel and lubricating oil economy of Diesel-engines will not be enough to overcome the added interest, insurance and depreciation charges resulting from difference in initial cost of the two types.

Furthermore the small two-cycle surface-ignition design produces an engine of extreme simplicity, and does not require an engineer of as much experience and skill as is required by the Diesel-engine. When the engines are over 300 b.h.p., or the trips are of long duration the saving in lubricating-oil by using the Diesel-type will alone more than offset the increased overhead charges, due to the fact that with an ordinary two-cycle surface-ignition engine the lubricating consumption is generally about 250 horsepower-hours per gallon, whereas with the Diesel-type the consumption is about 3,000 horsepower-hours per gallon, a ratio of 12 to 1 in favor of the Diesel-type, which is quite a consideration.

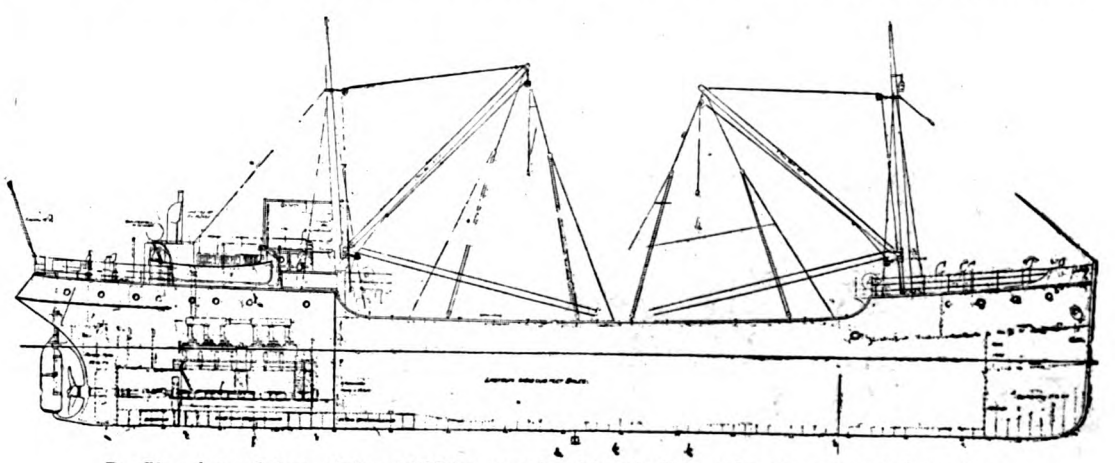
Small Motorships for East Asiatic Co.

Two Vessels of 1,000 *Tons Deadweight With Holeby Diesel-Engines*

REFERENCE has already been made to the three motorships that are shortly to be launched from the Nakskov shipyard, Nakskov, Denmark, and all are of interest, as they differ from the standard Scandinavian type. The two first vessels will add to the increasing number of small motorships that augment the field of motorshipping activities; both are to the order of the East Asiatic Co., and one of the latter is illustrated and described herewith. Known yet only by the yard No. 5, this 1,000 tons d.w. motorship may be employed for trade either in the Baltic or along the Siamese coast to Singapore, though no final decision has yet been made. The main dimensions are:

Length between PP	170 ft.
Breadth on frame	31 ft.
Depth	14 ft. 3 in.
Mean draught	12 ft. 10 in.
Hold capacity	41,800 cub. ft. bales
Power	560 i.h.p

The main engine is a 6-cylinder direct-reversible Holeby-Diesel four-cycle type trunk-piston motor of 14.567-in. bore and 22.441-in. stroke, developing 400 shaft h.p. (560 i.h.p.). The auxiliary machinery comprises a 2-cylinder 30 h.p. Diesel engine of same make, to which is clutched a 20-kw. generator that supplies the current for the electric deck-machinery and the light. With a friction-clutch as intermediate link, a spare air-compressor can also be driven. There also is a 6 to 8 h.p. Holeby four-cycle kerosene motor of the electric-ignition type that drives an emergency air-compressor and a ballast-pump. The main motor is a new model, force-feed and with oil-cooled trunk pistons. A three-step compressor is fitted and direct-driven pumps for cooling-water, bilge and lubricating-oil. In another publication this vessel has been referred to as a lighter, but she is a motorship. Forward, above the fore-peak tank holding 37 tons seawater, chain-lockers will be found, and the windlass with 1¼-in. chain, is driven by a 14 h.p. electric-motor. The two masts are provided with 42 ft. 3-ton derricks and an electric-winch of same lifting-capacity is mounted by each. These 3-ton winches are of the Nakskov Yard's own manufacture, they making a specialty of this machinery. The double-bottom increases in depth aft where fuel is carried, 23.7 tons being stored in the compartment below the main motor and 29 tons in the space in front of it, above which two fresh-water tanks of 2½ tons capacity each are mounted, while the lubrication-oil is stored aft in the twin-bottom below the thrust-bearing.



Profile plan of two sister 1,000-tons motorships building for the East Asiatic Co.

PALM-OIL FUEL FOR SURFACE-IGNITION ENGINES

In tests made by the Belgian Colonial army with Drott surface-ignition oil-engines of 120 b.h.p. down to 3½ b.h.p., palm-oil was used as fuel. It costs but 250 francs per metric-ton compared with 2000 fracs per ton for mineral crude-oil in the Belgian Congo. Fatty acids were completely burned and did not corrode the cylinders. The oil was of 16,610 B.T.U. and the consumptions registered was 310 to 557 grammes per b.h.p. hour respectively. The exhaust-gases were used to partially liquify the palm-oil. The annual exports of palm-oil from West Africa now amount to about 130,000 tons.

Conversion of the "Astmahco III" and "Astmahco IV" to Full-Powered Diesel-Ships

Two War-Time Built Freighters Made Practical and Economical Post-War Commerce Craft

By E. B. STOCKMANN, Marine-Superintendent, Astmahco Navigation Company, Inc.

SOME months ago the Astmahco Navigation Co., Inc. of New York purchased the vessels "Astmahco III" and Astmahco IV," formerly the "Lake Mohonk" and "Lake Oneida" respectively, which have recently been converted to full-powered Diesel-ships, have as a result of their conversion introduced many features which are of interest not only from the engineering standpoint, but from the aspect of economical operation as well. In order to have a clearer understanding it may be well to go into the history of these ships and their operation prior to the installation of the new power plant.

The "Lake Mohonk" and "Lake Oneida" were built by the Manitowoc Shipbuilding Corporation, Manitowoc, Wisconsin, for a Norwegian firm and were completed in the fall of 1917. At this time the United States, just having entered the war, and acting through the United States Shipping Board, requisitioned both these ships. At the time no engines had been installed. It is believed that the firm for whom they were originally intended, had in mind larger engines than those which were subsequently installed. Suffice it to say, however, that both of these ships were fitted two 320 B. H. P. engines, of the two-cycle, hot-bulb type. From the following table of specifications it will be seen that these engines—as intimated in "Motorship" at the time—were much too small for the ships in which they were installed and accounted in no small measure for the high cost of operation.

Table 1

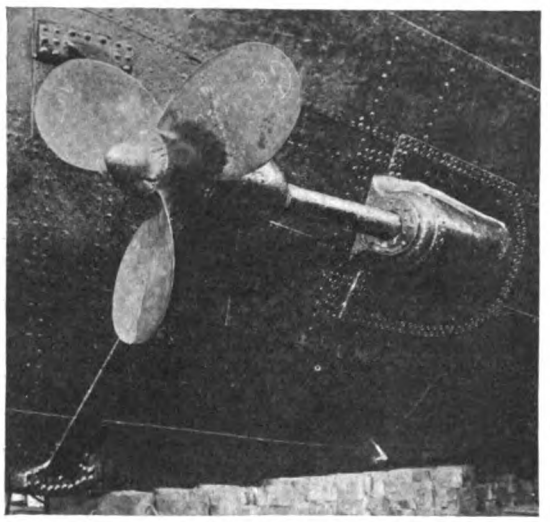
General Specifications:

1	Length O. A.	261 ft.
2	Length B. P.	251 ft.
3	Breadth moulded	43 ft., 6 in.
4	Depth moulded	23 ft.
5	Mean draft loaded	20 ft., 2 in.
6	Deadweight tonnage	3,600 tons
7	Gross tonnage	2,124 tons
8	Net tonnage	1,667 tons
9	Block co-efficient	0.72

Before their acquisition by the Astmacho Navigation Co., these vessels were under the operating management of the Clyde Mallory Steamship Co. But it was not long before it was found that the speed which could be obtained was so small and the fuel and lubricating-oil consumption so high relative to the speed, that economical operation with the power available was doubtful. As a consequence, both ships were tied up until the cessation of hostilities, when they were purchased by the present owners. It was decided at once to install two 500 B.H.P. McIntosh and Seymour Diesel-engines, but while waiting for the delivery of the engines the ships were operated with their original engines. Under favorable conditions of wind and weather a speed of approximately 5 knots with a fuel-consumption of 0.56 pound per B.H.P. per hour was made.

ORIGINAL EQUIPMENT

The "Astmahco III" and "Astmahco IV" while they were called motorships, nevertheless depended at sea for her auxiliaries upon a small donkey-boiler of the Scotch type, oil-fired, using the Dahl system. This boiler supplied steam for taking care of the various pumps including bilge, fire, general service, circulating-water, fuel-oil transfer, combined air and circulating-water, and a steam steering-gear, besides the deck-winches, capstan and anchor-windlass. In order to provide additional ventilation to cool the engine-room down to somewhat near normal temperatures, an electrically-driven American blower was installed with air-ducts passing around and between the engines and admitting cool-air through deflecting cones at different points. An Engberg 7½ K.W. steam-driven generator and a 12½ K.W. Sturtevant electric-generator supplied current for the blower, wireless alternator and lights. The remaining equipment consisted of one steam-driven Brunswick one-ton ice-machine, and one Wheeler surface-condenser, having a cooling-surface of 200 square-feet.



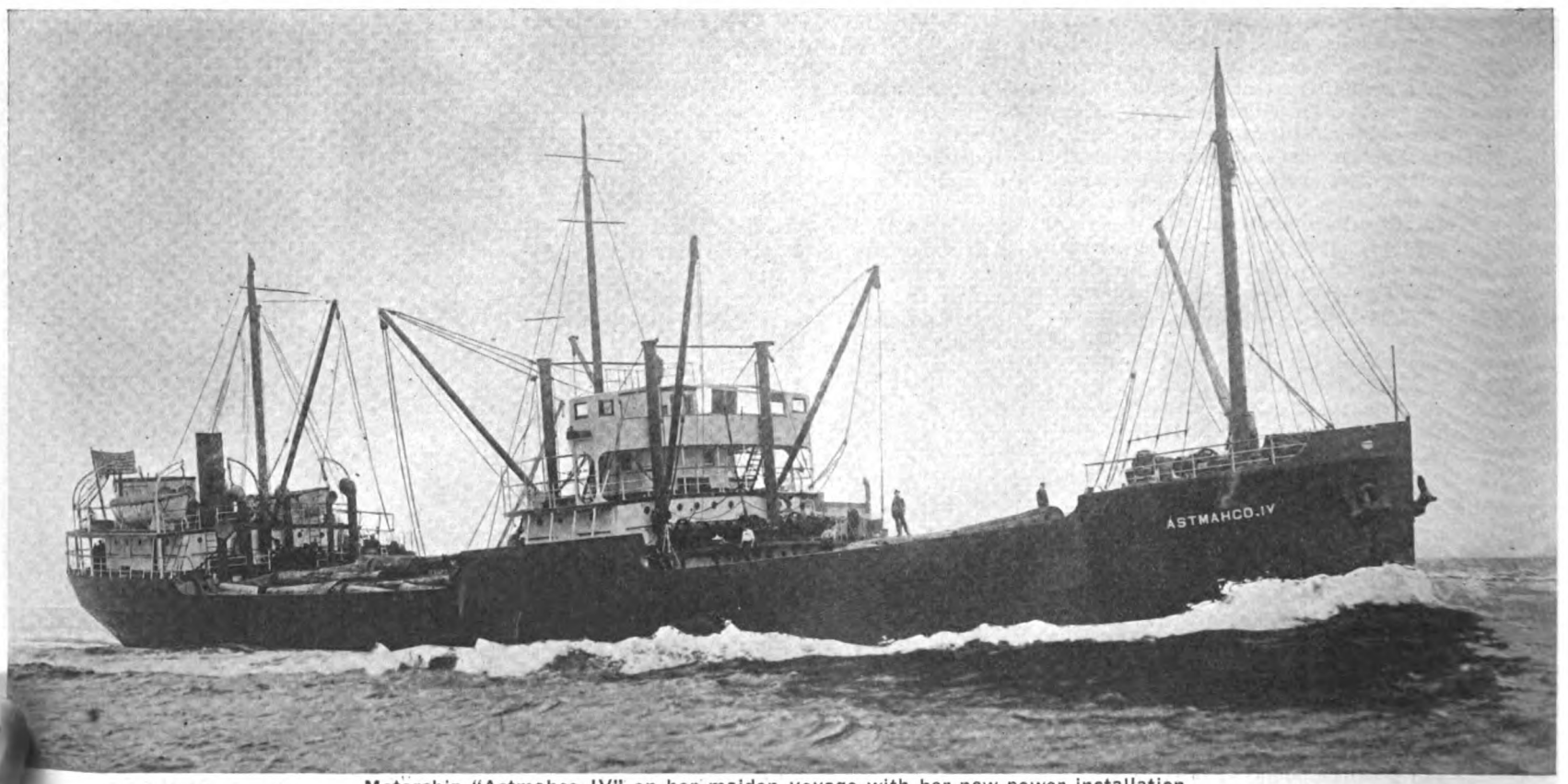
Depicting the arrangement of propeller bracket, and hull connection

CHANGES IN HULL STRUCTURE

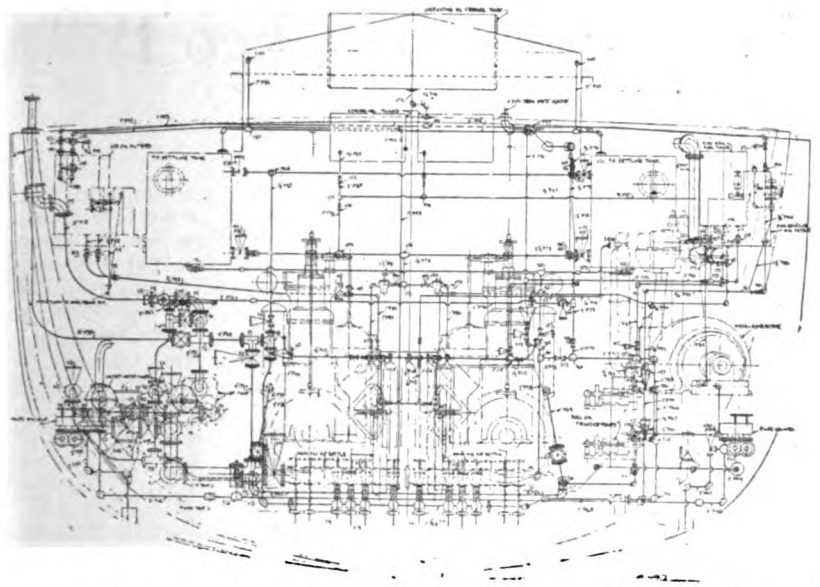
Installation of the McIntosh and Seymour-Diesel engines introduced two principal changes in the hull. First, in order to accommodate the length of the engines, the forward engine-room bulkhead had to be moved ahead eight feet. Second, in order to put on larger propellers the distance between center lines of the engines had to be increased. The forward engine-room bulkhead was removed in as few sections as possible and the old engines were then rolled out into the No. 2 hold and hoisted-up through the hatches. The remaining machinery was removed in the same way, such as was to be used again being stored in the No. 2 hold and the balance taken away from the ship.

As soon as the engine room was clear, the work of putting in the engine foundations began. These foundations were built directly on top of the No. 5 tank top-plating and consisted of a bult-up girder of the conventional H section. The upper and lower plates and the web are of ⅝ in. material and the angles are 6 in. x 3½ in. x ⅝ in. and 3½ in. x 3½ in. x ⅝ in., the longer flange on the former being necessary for bolting down the engine bed. Two such girder sections are used for each engine and both girders are suitably connected with 8 in. channels and fastened with 6 in. x 6 in. x ½ in. x 6 in. clips.

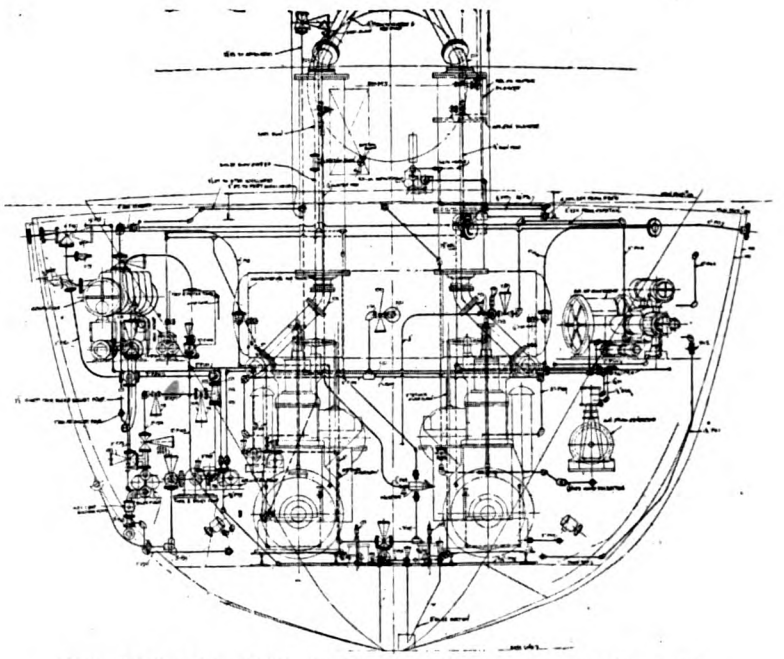
The distance between centers of the engines is 10 ft., 6 in., and the engine room is 36 feet long extending from frame 97 to frame 115. From the inside of frame 115 and extending through frame 118 a cast-iron stern-tube is fitted which in turn passes through a large cast-iron shaft-boss. This boss is fitted with a flange and webs, the former riveted to frame 118 and the outboard web to the hull plating. The after end of the stern-tube is threaded and a forged-steel nut fitted which brings



Motorship "Astmahco IV" on her maiden voyage with her new power installation



M.S. "Astmahco IV." Section at forward end of engine-room



M.S. "Astmahco IV." Section at after end of engine-room

up against the shaft boss. Lignum vitae is provided as the bearing material which is fitted inside a composition bearing and held in place from without by the usual form of composition bearing-ring. Riveted to the boss and to the hull plating is the large boss plating. The work of bending this plate and fitting it in place called for very accurate work on the part of the plate shop and reflects considerable credit to the Vulcan Iron Works which carried out the re-conditioning. The struts are of the usual form made of cast steel and having the upper palm riveted at frames 123 and 124 and the lower palm to the keel. In this connection it may be mentioned riveting for the lower was done with fitted rivets. The rivets were force fitted and then merely heated at the end and riveted in place. The reason for this is obvious when it is borne in mind that the rivets were 13 inches long and 1¼ inches in diameter. The shaft-boss and plating, outboard strut-bearing and propeller are shown in one of the drawings.

A new bulkhead at frame 97 was constructed in the same manner as the old forward engine-room bulkhead at frame 101. As much of the old plating as could be was used, such additional plating and stiffeners as required being fitted in accordance with requirements. Stiffening brackets were provided on both sides of this bulkhead under deck and very substantial brackets on the hold side at the bottom. The details of line-shafting are shown in another drawing.

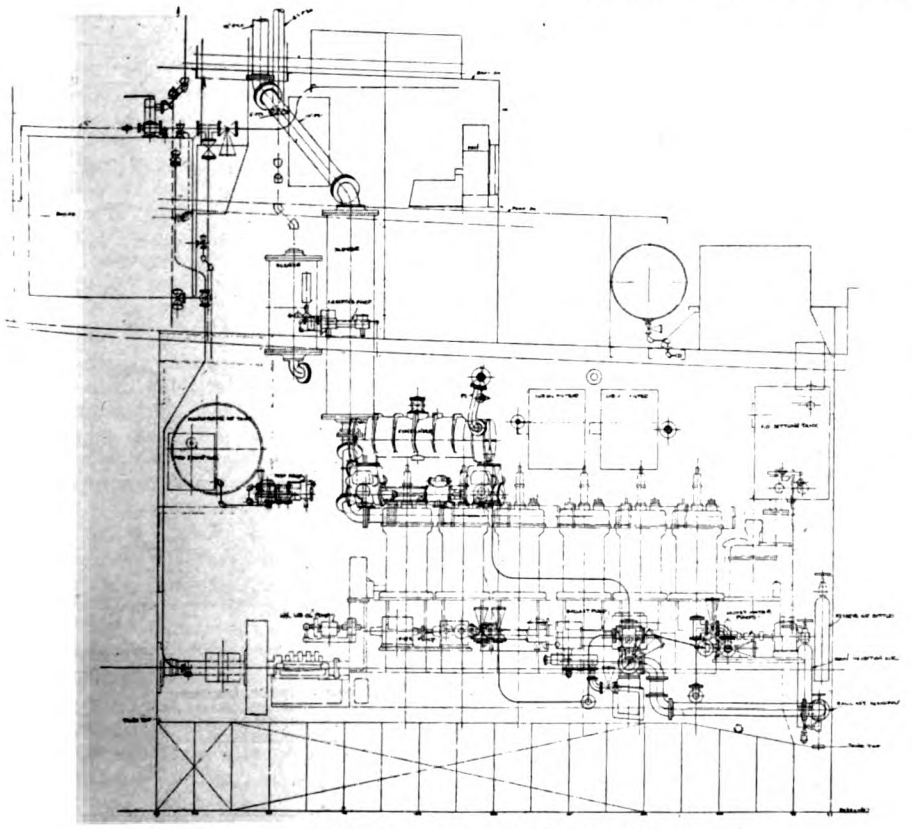
MACHINERY AND EQUIPMENT

As before stated the new main power plant for the "Astmahco III" and "Astmahco IV," consists of two 500 B.H.P. McIntosh and Seymour engines. These engines are fitted with horseshoe thrusts and transmit their power through a 9 in. shaft to cast-bronze propellers 8 feet in diameter and 6 ft., 5 in. pitch. Each engine has six cylinders 16 in. diameter by 24 in. stroke and has a normal speed of 190 R.P.M. A three stage air-compressor is fitted to each engine and is directly connected to the main engine crank-shaft. The capacity of each compressor is almost sufficient for both engines should one become disabled for any reason. An auxiliary steam-driven Bury air-compressor 8 in. x 10 in. x 5½ in. x 8 in., capable of producing 75 cubic-feet of free air per minute and an ultimate pressure of 1000 pounds per square-inch is also provided.

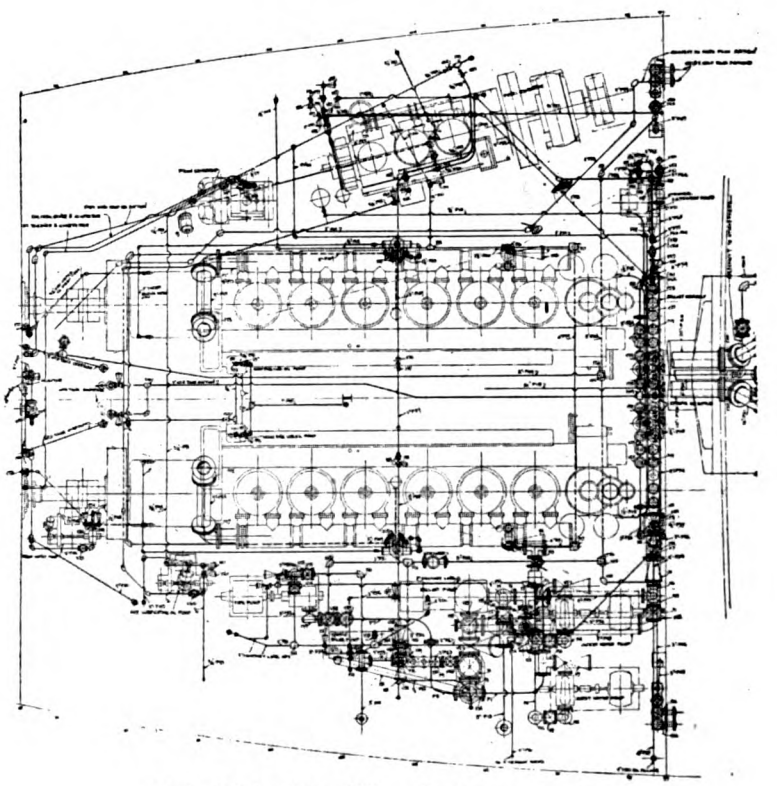
The general layout of the engine-room is shown the drawings. On the starboard side lower level are two Gould centrifugal circulating-pumps direct-connected to General Electric motors. Directly aft of this is a main bilge-pump which is also connected for use as a circulating pump. Following this in order are a small auxiliary steam bilge-pump, a three-stage Gould centrifugal fire and general-service pump direct connected to a General Electric motor, a Kinney rotary-piston lubricating-oil pump motor-driven through gears, and then a small Kinney rotary-piston fresh-water pump, Morse silent-chain drive.

On the port side lower level are located the electric-generating units. These consist of one Sturtevant steam-driven generator of 10 K. W. capacity and one 100 H. P. two-cylinder Diesel-engine direct-connected to a General Electric 70 K. W. generator running at 260 R.P.M. While inport loading or discharging when steam is used for the winches the former is used; at sea no steam is used at all and the larger unit supplies power for all pumps and auxiliaries including the Hyde hydro-electric steering-gear. It may be mentioned in passing that the Hyde steering-gear is one of the latest type of electric steering-gear. The operation of the valve for this gear is not done electrically, but directly through shafting and gearing from the pilot-house. A 10 H. P. electric-motor furnishes power for the pump supplying the hydraulic medium to the ram cylinders.

Alongside the bulkhead lower level are two Kinney rotary-piston type fuel-oil transfer pumps, Morse silent-chain drive from Robbins and Meyers electric-motors. Situated against the bulkhead is



M.S. "Astmahco IV." Arrangement of main Diesel-engines



M.S. "Astmahco IV." Engine-room plan

the ballast manifold which communicates with the double-bottom tanks carrying fuel-oil.

Starting from the starboard forward end of the upper level, there are located the engineers store-room, settling-tanks for fuel-oil, Richardson-Phoenix lubricating-oil filters fitted with Cutler-Hammer heating-coils; Alberger surface-condenser of 400 square-feet cooling-surface capacity; fitted Dean combined air-and-circulating pump size 7 in. x 9 in. x 9 in. x 10 in.; Worthington steam-boiler feed-pump size 5¼ in. x 3½ in. x 5 in., and a hot well. Alongside the after bulkhead is the large maneuvering air-tank capable of holding air at pressure of 300 lbs. per square-inch.

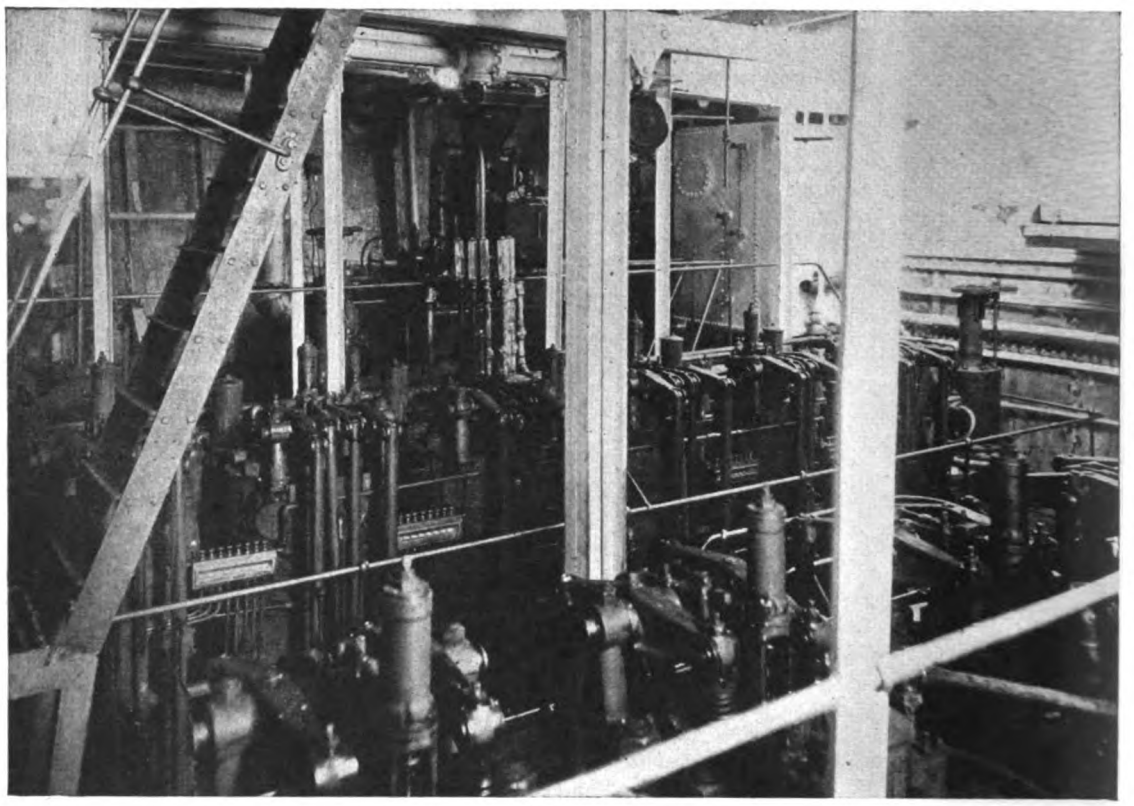
On the port side upper level are located the Bury auxiliary air-compressor. Next to this comes the 100 H. P. auxiliary Diesel engine projecting up from its foundation on the lower level, together with its air-bottles. A smaller Richardson-Phoenix lubricating-oil filter for this engine is situated alongside, and beyond the engine are the switch-boards and another fuel-oil settling-tank. On the forward bulkhead directly under the engine-room skylight are located two kerosene tanks for use when starting and occasionally when stopping the engines. The larger of the two switchboards is designed to carry the load of the units handled by the large generator and distribution is made from the board to the electrically-driven pumps, steering-engine and lubricating-oil filters. The smaller switchboard is connected to the smaller generator and distribution from this board is made for the lighting circuits, wireless charging, etc. A double-throw switch is mounted below the large board for connecting the circuit from the Sturtevant generator to the steering-engine circuit on the large board. This is used in case the large generator is shut down at sea for any reason.

The boiler-room floor is on the main-deck level and in this space are a Blake and Knowles fuel-oil pump for the donkey-boiler; three McIntosh and Seymour silencers, two for the main engines and one for the auxiliary engine are located here. The silencers as well as all exhaust piping to and from the silencers is covered with 85% Magnesia, and the whole covered with galvanized sheet iron.

The American blower is located above the engine-room grating on the poop deck level, and takes air through the forward bulkhead and delivers it directly down into the engine-room. The lubricating-oil tank is placed on deck amidships directly aft of the engine-room skylight and is fitted with steam coils for heating in cold weather.

The Brunswick Ice Machine has had a gear fitted to the flywheel of the steam-engine connecting by means of silent chain to a sprocket on a 3 H.P. General Electric motor. When running without steam, the connecting-rod is disconnected.

One important addition to the engine-room was the placing of a hinged skylight over the forward end. Besides providing additional ventilation, the additional light which is admitted is very considerable.



Engine-room of the "Astmahco IV" showing twin 500 shaft h.p. McIntosh & Seymour Diesel-engines

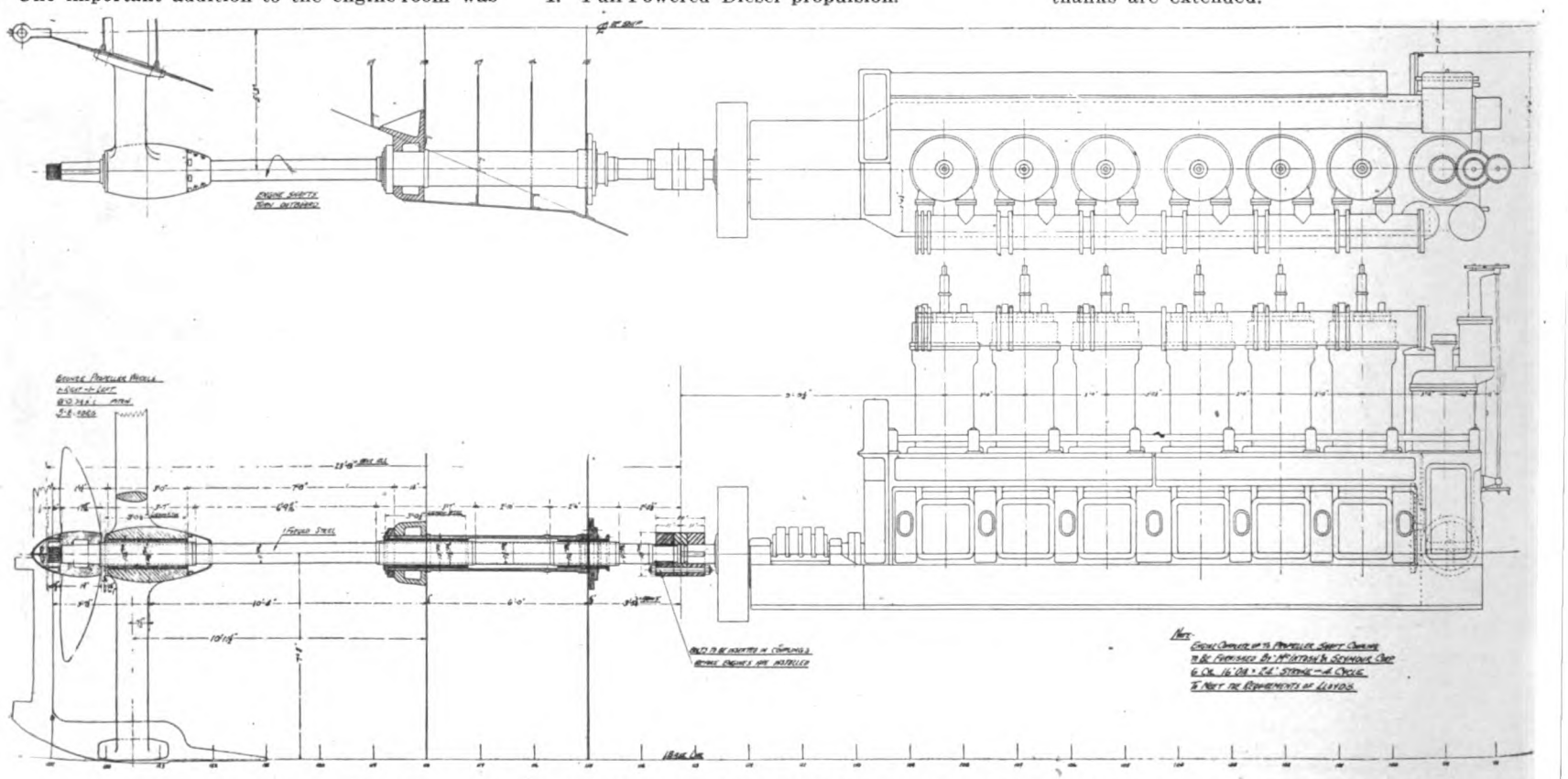
The sea trial of "Astmahco IV" was made on March 15, 1921, but owing to very heavy fog in the lower harbor, no extended speed trials could be obtained. Nevertheless, a very good opportunity for witnessing the ability of the engines to maneuver presented itself. A total of 253 bells was answered during a period of approximately 6 hours. A short speed run up the Hudson indicated a speed of about 10 knots running at 195 R.P.M. in the light condition. The more important data collected on this trip are given in Table III.

Since the trial, the "Astmahco IV" has made her first voyage to Mexico with the new engines. An average speed of 9 knots was obtained running for the most part of 170 R. P. M. with a fuel-oil consumption of *four tons* per day.

In summing up, it may be pointed out that these possess the following distinctive advantages:

1. Full-Powered Diesel propulsion.
2. Low fuel-oil consumption.
3. Independence of steam at sea.
4. Compact power space.
5. Decrease in size of engine-room crew.
6. Perfect maneuvering flexibility.

It would not be quite fair to conclude this brief description without making acknowledgement to those who were associated in carrying out the work of installation. In this connection, special mention must be given to the Vulcan Iron Works and their staff. The material and workmanship that has gone into these ships is of the very highest order, and the organization adheres to the traditions exactness and rigid rules of older American and European practise. The work of assembling and installing the main and auxiliary Diesel engines was done under the direction of Mr. Hugo Haas, erecting engineer for McIntosh and Seymour, also chief-engineer of the "Astmahco III." To the many other engineers who were associated with the author in this work, including Chief-Engineer Peter Eiduck of the "Astmahco IV," his thanks are extended.



M.s. "Astmahco IV" showing new propeller-shafting and stuffing-box arrangements

Data on Sea Trial of M. S. "Astmahco IV"

Time	Port Engine: R. P. M. Engine	Port Engine: R. P. M. Starb'd. Engine	Port Engine: Injection Air	Port Engine: Air 2nd Stage	Port Engine: Air 1st Stage	Air Starting Tank	Starboard Engine: Injection Air	Starboard Engine: Air 2nd Stage	Starboard Engine: Air 1st Stage	Temp. Cir. Water Disch. Main Engs.	Temp. of Oil in Filter Main Engs.	Diesel Generator: Injection Air	Diesel Generator: R. P. M.	Diesel Generator: Volt	Diesel Generator: Ampere	Boiler Press	Vacuum	Pressure of Oil at Boiler	Steam Air Compressor	Port Electric Cir. Pump	Starboard Electric Cir. Pump	Steam Fire Pump	Auxiliary Bilge Steam Pump	Main Bilge Pump
10:02	...	...	...	...	...	...	...	...	...	.....	...	...	...	...	...	...	...	...	Start	...	...	...	...	...
10:10	...	...	...	...	...	...	...	...	...	.....	...	...	Started			...	...	...	...	...	...	...	...	...
10:20	192	194	975	180	50	295	1010	230	40	.....	...	1000	256	112	250	124	1	58	...	Start	...	Start	...	...
10:40	...	...	...	...	...	...	...	...	...	.....	...	...	...	...	...	...	...	...	...	Stop	...	Stop	Start	
10:45	...	...	...	...	...	...	...	...	...	.....	...	...	...	...	...	...	...	...	...	...	...	...	...	Start
11:15	...	...	...	...	...	...	...	...	...	.....	...	...	260	112	200	...	...	...	...	...	Start	Start	...	Stop
11:20	...	...	...	...	...	...	...	...	...	.....	...	...	...	...	...	...	...	...	Stop	...	...	...	...	...
11:30	198	198	...	...	...	...	...	...	...	.....	...	...	...	...	...	...	...	...	...	...	...	...	Stop	...
12:00	Half	Speed	800	175	50	280	850	225	40	.....	...	820	...	...	...	...	...	...	Start	...	...	Stop	...	...
12:15	...	...	...	...	...	...	...	...	...	.....	...	...	256	112	220	...	...	...	...	...	...	...	...	...
1:10	...	...	...	...	...	...	...	...	...	.....	...	...	...	...	...	...	...	...	Stop	...	...	...	...	...
1:15	...	...	...	...	...	...	...	...	...	.....	...	...	256	112	170	...	...	...	...	...	...	...	...	...
1:20	192	188	990	210	62	305	1010	320	70	110 to 125	...	1000	...	...	...	115	2	55	...	...	...	...	...	...
1:37	...	...	...	...	...	...	...	...	...	.....	...	...	...	...	...	...	...	...	Start	...	...	...	...	...
2:15	...	...	...	...	...	...	...	...	...	.....	...	...	260	112	190	...	...	...	...	...	...	...	...	...
2:30	200	196	1010	220	62	250	1090	310	60	85 to 105	80	1010	...	110	138	120	2	60	Stop	...	...	...	...	...
3:00	200	194	990	200	62	300	1010	180	30	85 to 105	...	1010	...	110	138	126	1	65	...	...	...	...	...	...
3:15	...	...	...	...	...	...	...	...	...	.....	...	...	256	110	110	125	0	60	...	...	...	...	...	...
3:30	200	194	1000	220	62	...	1020	175	30	70 to 110	80	1020	...	111	138	...	...	...	...	...	...	...	...	...
3:45	...	...	...	...	...	...	...	...	...	.....	...	...	...	...	...	...	...	...	Start	...	...	...	...	...
4:15	...	...	...	...	...	...	...	...	...	.....	...	...	260	110	90	...	...	...	...	...	...	...	...	...
5:00	...	...	...	...	...	...	...	...	...	.....	...	...	...	...	...	...	...	...	...	...	Stop	...	...	...
5:15	...	...	...	...	...	...	...	...	...	.....	...	...	260	110	50	...	...	...	Stop	...	...	...	...	...
6:00	...	...	...	...	...	...	...	...	...	.....	...	...	Stopped			...	...	...	...	...	...	...	...	...

STARTING AIR TANK
Drop of pressure with aux. air compressor stopped
281 to 271 to start 2 engines.
271 to 252 full ahead to full astern 2 engines
252 to 248 full ahead to full astern 1 engine
248 to 240 to start 2 engines

MANEUVERING ON SEA TRIAL

Port engine	118 bells
Starboard engine	135 bells
Total	253 bells

Air-Injection or Mechanical-Injection

By J. L. CHALONER

Part IV—Conclusion

(*Continued from page* 311, *April issue*)

Exhaust temperatures are also very useful in drawing up comparison regarding the relative degree of combustion for the two systems, and whilst the following table is recorded for purposes of general comparison, the actual values must be taken with a certain amount of reserve. Position of the recording instrument in the exhaust-line, the number of cylinders, the cooling arrangement of both exhaust-valves and exhaust-pipe, are all factors which influence the actual temperature. The ideal method would be to design an experimental engine, in which all conditions could remain unchanged except, of course, the method of fuel-injection. Experiments should be made with the same class of fuel.

EXHAUST TEMPERATURES

Horse-Power per cylinder	Degrees Fahrenheit Air-injection.	Mechanical-injection
40	....	620
50	585	....
80	700	730
115	....	755
125	800	....
150	840	....

Fuel-consumption has, of course, also an effect on the degree of combustion, and gives an indication of the relation of the degree of combustion to the load on the engine. Air-injection consumption increases with a decreasing load owing to the present form of fuel-valve design. The consumption, therefore, increases in an inverse proportion to the load, and in fact the tests have shown that the rate of increase in the fuel-consumption below five-eighth load is more rapidly with air-injection than with mechanical-injection.

It is proposed to give a series of actual tests in some other discussion to be published at a future date, when several series of tests have been completed and analyzed. For the present let it suffice to state that for cylinders up to a rating of 80 b.h.p. per cylinder the fuel-consumption is about 5% in favor of mechanical-injection, and for powers of 125 b.h.p. per cylinder and over the reduction is up to 7½%. On the indicated horse-power rating the relation was not as favorable, which indicated the limitations of the present mechanical injection method. However, it should be remembered that the laws of progress will help to remedy any discrepancy in this direction.

A recent test on a 260 b.h.p. engine has resulted in a fuel-consumption of 0.40 lb. per b.h.p. being attained, the fuel-oil used being about 0.90 specific gravity. At half-load the consumption had only increased to 0.43 lb. per b.h.p., which shows the remarkably low increase of fuel used over a comparatively wide range of load.

General Practical Notes

With the above it has been attempted to deal at length with some of the more important thermo-chemical and thermo-dynamical relations, which exist inside a heavy-oil engine generally, and the fuel-valve and combustion-chamber in particular.

In dealing with the design of a mechanical-injector, it should be remembered that the essential point is not so much a question of a perfect spray, but a complete atomization. The spray has, of course, been applied successfully, but from an economy point of view, there was one apparent draw-back. A well-designed engine should be capable to deal with as wide a range of fuels as possible, and with that object in view, an atomizer is more effective than a sprayer.

Again, for starting-up the cooling effect of the injection-air has a retarding influence on a prompt ignition, whilst with the direct injection no difficulty is experienced in bringing the first part of the fuel-charge in immediate contact with the hottest zone inside the combustion-chamber, hence a positive ignition is ensured.

Again whilst the injection of the fuel with the air method may be classed under two distinct operations, i. e., fuel-pump deposits requisite amount of fuel in fuel-valve casing; fuel-valve controls the actual injection period, the fuel-pump of the mechanical system has both the fuel-charge and the injection period under control. Such an arrangement is of decided advantage particularly in the case of a fuel-valve sticking up, when in the case of air-injection the compressed-air will cause excessive pressures.

Variable injection-pressure in relation to the load is still a necessity with present-day designs, although more or less successful constructions have been applied to control either mechanically or even electrically the air-pressure relative to the load. The rate of injection depends on the pressure difference between the fuel-valve casing and the combustion-chamber, and only a slight increase in the combustion-pressure will influence this rate, when using the air system, whereas with the other system the pressure difference is fundamentally so much higher, that a slight variation in the combustion-pressure has no effect on the rate of injection.

Generally speaking, it can be stated that with air the opening phase of the injection period requires the closest attention to provide correct mechanical and thermal conditions. On the other hand the mechanical method demands that specific attention be paid during the closing phase of the injection period, so that no "after-drip" may occur and interfere with the highest possible degree of combustion. The problem connected with the after-drip is of primary importance with a simple mechanical-injection device, and its solution will bear an important relation to the general development of this type of engine.

Actual design of the nozzle for direct injection is also still the object of careful examination. As already shown, the leading dimension of the fuel-orifices in the nozzle or flame-plate are somewhat delicate proportions and difficulties have been experienced when using the conventional designs in connection with the burning of heavy residual-fuels. The actual fuel-pump pressure is also still a matter of much experimental investigation. The high pressures, which are said to be used in connection with the mechanical system, are certainly not as essential as it has been made out to be, and tests so far made show that a combination of medium compression-pressures and injection-pressures are quite sufficient to give satisfactory running results.

There is no doubt that with mechanical-injection there are still various points which require the closest attention in order to ensure that an engine running on this system shall be in every respect as reliable, flexible and economical as the engine using the air-injection principle. On the other hand, the surface-ignition oil-engine uses mechanical-injection, has proved its practical utility for a number of years.

It is of no moment that most of the leading continental oil-engine manufacturers have attempted unsuccessfully to solve the problem of "Mechanical Injection." In the first instance the testing plant of leading manufacturers consisted generally of a small or medium powered unit. As mentioned before, the conditions for mechanical-injection become more favorable with larger powers, a condition which has to a large extent retarded the completion of the experimental work. The perfection of the two-stroke engine, the practical construction of a 400 B.H.P. per cylinder unit, are all factors which will help to solve the problem.

FINIS

NEW ITALIAN 4,500 I.H.P. MARINE DIESEL-ENGINE

We have before us drawings and details of a new high-powered merchant-marine Diesel-engine to be built by Ansaldo San Giorgio of Turin, Italy. This engine has six cylinders 730-mm. (28.740 in.) bore by 1,050 mm. (41.338 in.) piston-stroke, and develops 4,500 i.h.p. at 120 r.p.m. But this engine can operate with an overload and develop 5,200 i.h.p. (4,000 shaft h.p.) at 130 r.p.m.

An interesting feature is the construction of the crankshaft in three sections. Although the scavenging-pump air-injection and manoeuvring air-compressors, also the cooling and lubricating pumps are driven off the main engines direct, the fuel-consumption is only 183 grams (0.405 lb.) per shaft h.p. hour, or 0.312 lb. per ind. h.p. hour. This is probably the lowest consumption yet claimed for a two-cycle Diesel engine. An article will be published very shortly.

From Sailing-Vessel to Full-Powered Motorship

Conversion of the "Caupolican," ex-"Poseidon," to Oil-Engine Power at a South American Port.

BY ALL the laws of progress the old iron sailing-ship hulk "Caupolican," ex "Patria," ex "Poseidon," should have gone to the happy hunting-ground of good ships long ago; but, through the foresight of the Chilian firm of Broquez y Cia of Valparaiso, she has been converted to an economical full-powered passenger and cargo ship and is now attracting favorable comment along the South American Coast. Two

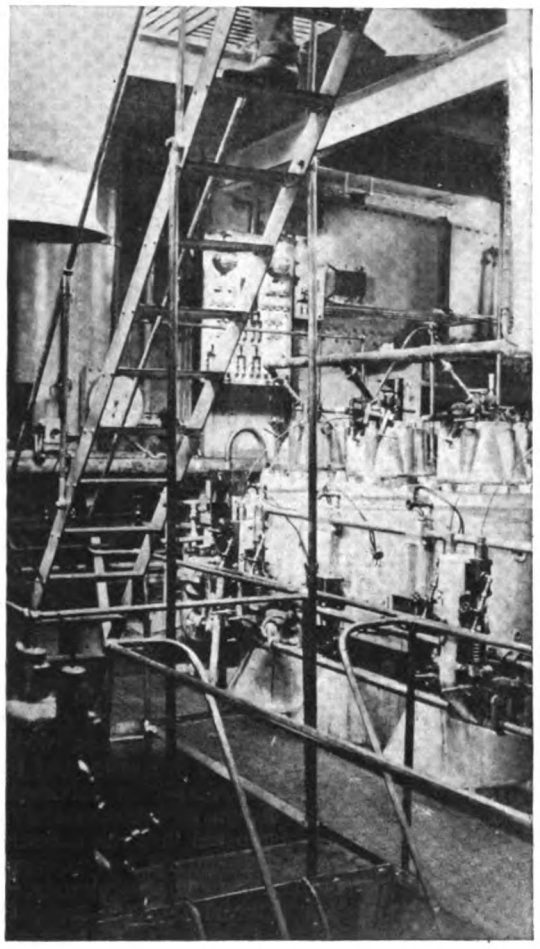
Bow view of the 1,200 shaft h.p. Chilian motorship "Caupolican"

600 b.h.p. Sumner heavy-oil engines of the surface-ignition type have been installed aft, and these give the craft a speed of 11 knots on a fuel-consumption of 5 tons per day. Her dimensions are as follows:

Cargo-Capacity	2,800 tons
Length	264 ft. 6 in.
Breadth	39 ft. 8 in.
Depth	25 ft.
Draft	21 ft.
Passenger Accommodation	28 first-class
Power	1,200 shaft h.p.
Daily fuel-consumption	5 tons

As a sailing-ship she originally carried about 3,000 tons of cargo, but had a variable and indefinite speed, but now she carries 500 tons less freight, has a definite and better average speed, while the added passenger-quarters more than compensate in income what is lost in space. Also she is manned almost as cheaply as when a full-rigged German ship, taking all things into consideration. So material benefits are resulting from the conversion. Her present crew consists of 45 officers, engineers and men. On her maiden voyage a cargo of coal was carried.

Through the courtesy of Reg. Brett, Chief-Engineer of the vessel, we are enabled to give the interesting information about this vessel. Mr. Brett



Engine-room of the motorship "Caupolican," showing part of one of the twin 600 shaft h.p. Sumner oil-engines

is an engineer for Gaston, Williams & Wigmore of New York and Valparaiso, and was sent down to superintend the work on the ship and to get her into shape, as the original work of installing the first part of machinery had not been very satisfactorily carried-out. Upon inspecting the preliminary work on the installation he found that the engine-bases were in, as well as the shaft and stern-tubes, but they were out of line, and things generally were hardly shipshape. The stern-tubes had been put-in with the hull in the water, working from the engine-bases back. They had to be relined and two new plates inserted in the after bulkhead. All this had to be carried-out with the vessel in the water with her bow weighed-down seven hundred tons of rocks and moored in an open bay, often so rough that the workmen could not be sent home at night. At other times they could not reach the ship in the mornings.

The twin 600 b.h.p. Sumner oil-engines are of the surface-ignition type with open crank-pits, crossheads and guides, and were constructed in Seattle, Wash. Mr. Brett says that he found them remarkably free from vibration and they maneuver with the greatest of ease. Full-speed ahead to full stern is carried-out in from 8 to 10

Left to Right—Chief-Engineer R. H. Brett; Captain Nicolas Urrutia, and First-Officer Valentin Broquez of the motorship "Caupolican"

seconds after receiving the bell from the bridge. By use of an electric-heating device which he designed and made in Valparaiso, these engines can be started from cold instantly and with a greater degree of surety than obtained even with a Diesel-engine in cold weather.

For auxiliary power in the engine-room there is a 25 b.h.p. Fairbanks-Morse horizontal oil-engine connected to a Sullivan air compressor; a 12 b.h.p. Robey oil-engine driving an electric dynamo; a 5 b.h.p. French-built gasolene motor operating another dynamo. Then there is a 3 kw. Delco electric-lighting set which gives perfect satisfaction. It is Mr. Brett's intention to remove the British and French engines and install three more Delco sets.

The engine-room crew consists of Chief-Engineer Reginald Brett; three student engineers, three greasers and three wipers, none of whom had previously seen an oil-engine. A number of trips have been made, without even an "overly" hot-bearing, or any of the "troubles" often met with in a new installation. The cast-iron propellers, however, are unsuitable as the slip often runs from 40 to 50% and never under 20%. With a good set of bronze-propellers Mr. Brett believes that 1½ to 2 knots better speed would be gotten from the installation. We understand that Chief-Engineer Brett is anxious to utilize his experiences gained with getting this vessel in shape by undertaking a similar task on the behalf of some American shipowner who has a vessel that needs converting, and would return to the States for that purpose.

MOTORSHIP "MALIA" LAUNCHED.

The twin-screw passenger and cargo motorship "Malia" was launched on March 8th at the yard of Wm. Hamilton & Co., Port Glasgow, Scotland. She is specially interesting by reason she will be powered with two 500 shaft h.p. Cammellaird-Fullagar opposed-piston Diesel engines. Her dimensions are as follows:

Deadweight capacity	5,800 tons
Length	315 feet
Breadth	50 feet
Depth	27¼

Her owners are the Anchor-Brocklebank Line (T. & J. Brocklebank) of Liverpool, England.

Instead of equipping the "Malia" with twin 1,000 shaft h.p. engines, two 500 shaft h.p. Cammellaird-Fullagar Diesel engines will be installed instead, by order of the Anchor Brocklebank Line managers, and the higher-powered sets will go in a larger motorship now building.

LAUNCH OF MOTORSHIP "LOSADA."

The twin-screw cargo motorship "Losada" built to the order of the Pacific Steam Navigation Co. was successfully launched by Harland & Wolff, Ltd., at Govan, on the 10th inst. Her principal dimensions are: Length overall 420 ft.; breadth 54 feet; depth to shelter deck 35 ft. 3 in.; with a gross tonnage of 6,750. There is a heavy derrick fitted at the after side of the foremast suitable for lifts up to 40 tons. The steering-gear, windlass, and the ten winches are all electrically driven, steam being used for heating and cooling purposes only, and will be supplied by an oil-fired donkey-boiler. The propelling machinery consists of two six-cylinder four-cycle Diesel oil-engines of Harland & Wolff's standard type, built on the well-known Burmeister & Wain system, and develop 3,200 i.h.p. at 115 revs. per minute. "The Losada" is the third motor-driven vessel built by Harland & Wolff Ltd. for the Pacific Steam Navigation Co., the others being the "Lobos" and "La Paz."

CALEDON CO. BUILDING 15,000 TONS MOTORSHIP.

It is expected that the 15,000 tons d.w.c. motorship ordered last fall from the Caledon Shipbuilding Co., Dundee, Scotland, by the Ocean Steamship Co., Ltd. (A. Holt & Co., Blue Funnel Line), India Building, Liverpool, England, will be ready about July next. Two eight-cylinder Diesel engines aggregating 6,400 i.h.p. are nearing completion at Burmeister & Wain's works in Copenhagen. Three 150 b.h.p. B. & W. auxiliary Diesel-engines also will be installed for driving electric generators.

SHIP BUILDING REVIEW NUMBER OF "HET SCHIP."

We recently received a copy of the annual review number of "Het Schip," the well-known Dutch ship-building magazine. The same contains a resume of the ships built during 1920 in Dutch ship-yards.

Interesting Notes and News from Everywhere

BROWN-CAMMELLAIRD-FULLAGAR ENGINE.

John Brown & Co.'s first Cammellaird-Fullagar type marine Diesel engine will be of 2,500 shaft h.p. from six cylinders, 22 in. bore by 23 in. stroke.

ROWAN-CAMMELLAIRD-FULLAGAR ENGINE.

The marine Diesel-engine of the Cammellaird-Fullagar design now being built under license for a single-screw vessel by David Rowan of Glasgow, will develop 1,500 shaft horse-power.

MOTORSHIP BUILDING AT RANGOON.

"Kungnan," a 1,500 tons d.w. auxiliary-schooner is nearing completion at Rangoon, Burmah. She is building to the order of Maganlal Pranjivan & Co. of Rangoon, and is being equipped with a 400 b.h.p. Avance surface-ignition oil-engine.

BIG LOANS FOR MOTORSHIP CONSTRUCTION.

Loans recently applied for from the Swedish Government by shipowners have been granted. Of these loans Kr. 900,000 have been granted for three large Götaverken built Diesel vessels.

OUR N. Y. STATE CANAL ARTICLES

Owing to great pressure on space we are obliged to hold-over until next month the third of our Special Commissioner's series of articles on the New York State Canal.

"ROSANA" A SMALL FREIGHTER WITH WESTERN DIESEL ENGINES

Recently placed in service was the "Rosana," a 300-ton freighter owned by the Alberto Fait Co., Puntarenas, Costa Rica. She is propelled by two 75 b.h.p. Western Diesel engines built at Los Angeles, Cal.

OIL-ENGINED GENERAL-SERVICE MOTORSHIP LAUNCHED

A general service motor lighter of about 126 ft. length is now under construction by the Vinyard Shipbuilding Co., Milford, Del., for the Elizabeth Lighterage Co., of Elizabeth, N. J. In this vessel a 240 b.h.p. Worthington marine oil-engine will be installed.

"OLIVE BRANCH" A BURMESE AUXILIARY.

Among the many hundreds of Bolinder-engined merchant craft in service is the "Olive Branch," a wooden auxiliary-bark of 744 gross tons built and placed in service by A. V. Joseph of Rangoon, Burma, and powered with a 240 b.h.p. Bolinder oil-engine. She is 165 ft. long by 32 ft. breadth.

SPANISH DIESEL-DRIVEN TUG.

Last year the 127 tons motor-tug "Arin Mendi" was placed in service by Cie. de Remolacadores Ibaizabal (Sota y Aznar, managers) of Bilbao, Spain. The little craft was built by the Cia Euskalduna de Constr. of the same city, and is propelled by a 4-cylinder, two-cycle 13⅜ x 21¼ in. Sulzer Diesel-engine.

HIGH-POWERED ADMIRALTY LAUNCH.

Trials of the 1,600 b.h.p. gasolene-engined motorboat built for the British Admiralty by John I. Thornycroft & Co. were recently carried out in England. With a load of over 4 tons a speed of 37 knots was attained and with a load of 1½ tons 41 knots was reached. The vessel is 75 ft. long and is equipped with twin 800 b.h.p. Thornycroft gasolene engines.

LAUNCH OF MOTORSHIP "AMERIA"

The first motorship of the Norwegian-Mexico Line has been launched at the Akers Yard, Christiania, and named "Ameria." She should not be confused with the Danish motorship "Amerika" illustrated some time ago in this journal. The "Ameria" is practically a sister ship to the "Borgland," one of Fred Olsen's lines, and is of 7,500 tons d.w.c. Her dimensions are as follows:

Length	377 ft.
Breadth	51 ft., 3 in.
Depth	34 ft.
Power	2,200 i.h.p.

Akers' built Burmeister & Wain type four-cycle Diesel-engines are installed. All the auxiliaries will be electrically-driven and there will be 14 derricks and 10 winches, all electric windlass and steering-gear. She is the fourth motorship built by Akers.

NAVY BUILDING AUGSBURG DIESEL ENGINES

A number of 3,000 b.h.p. and 1,258 b.h.p. Augsburg type four-cycle submarine Diesel-engines are now under construction at the Brooklyn Navy Yard.

MOTORSHIP BUILDING PROFIT.

During 1920 the net profit realized by Burmeister & Wain, the Diesel engine and motorship building firm at Copenhagen, amounted to Kr. 10,260,125, including the amount brought forward from the previous year.

SMALL SWEDISH STEEL MOTORSHIP.

The Svenska Sockerfabriks Aktiebolaget, of Stockholm, have taken delivery of a 450 tons gross steel motorship named "Fringilla," built in 1920 at the Nya Varvsakt Vastervik. She is propelled by a 370 i.h.p. Polar two-cycle Diesel engine.

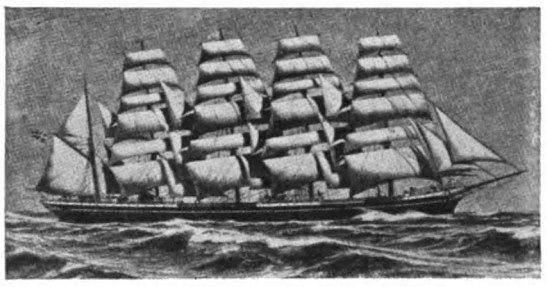
Another vessel completed in 1920 is the "Gunlog," a wooden boat of 450 tons gross and powered with twin 120 b.h.p. Bolinder oil-engines. She is owned by the Frode Shipping Co. of Kalundborg, and built by the Marstal Staalskibsbyggeri, Denmark.

CRAIG-ENGINED MOTORSHIP "SUPHENCO" LAUNCHED

"Suphenco," the Submarine Boat Corporation's new 5,350 tons d.w.c. motorship, was launched at their Newark yard on February 12th. This vessel will be equipped with the 2,240 i.h.p. Craig four-cycle Diesel engine recently completed at Jersey City. This engine weighs 275 tons, and develops 1,850 shaft h.p. at 105 r.p.m. It has six cylinders, each 30-in. bore, with 48-in. piston stroke.

EAST ASIATIC COMPANY'S TRAINING VESSEL.

When the war broke-out Ramage & Ferguson, Leith, Scotland, were building a Diesel-engined training-ship for the East Asiatic Company. The hull was commandeered for the British Admiralty and used for a tanker. The engine for this vessel was a non-reversible Burmeister & Wain 600 b.h.p. four-cycle trunk-piston model. This has been completed and shipped for installation in a



second training-ship named "Kobenhavn" now nearing completion at the same yard. She is an auxiliary craft, as will be seen from the illustration on this page, and is of 6,000 tons d.w.c. and 7 knots speed under power alone in calm weather; but with sails and power an average speed on voyages of 9 to 10 knots is expected. Each of her five masts weigh 25 tons, the smallest being 90 ft. high. The sail area is 56,000 sq. ft. Modern sail hoisting methods are employed. In addition to the regular crew of 50 officers, engineers and men, twelve training-boys will be carried. Her length is 340 ft., with 48 ft. 4 in. breadth, and 27 ft. depth. Her gross tonnage is 3,420 tons. A reversible propeller is fitted.

ANOTHER OIL-ENGINED TUG FOR MUNSON LINE.

By the time this appears in print an interesting oil-engined tug boat will have been launched ready for trials by the Nyack Shipbuilding Co. of Nyack-on-Hudson, N. Y., for the Munson Steamship Line's service in Cuba. This vessel will be named "Mineviatas" and is equipped with a 200 b.h.p. Fairbanks-Morse surface-ignition marine oil-engine, length 80 ft. by 18 ft. breadth and 5 ft. 6 in. draught. She is the second tug-boat which the Munson Line has equipped with a Fairbanks-Morse oil-engine, the sister boat having been in service for about a year.

STANDARD OIL ORDERS ANOTHER MOTOR-BARGE.

An order for a 350 tons d.w. motor tank-barge has been placed with the Baltimore Dry Dock & Shipbuilding Co. by the Standard Oil Co. of New Jersey. Gasolene or kerosene engines of 350-400 b.h.p. aggregate will propel this little vessel.

ADMIRAL BENSON AND DIESEL ENGINES.

In an address recently delivered before the New York Press Club, Rear Admiral W. S. Benson, Chairman U. S. Shipping Board, made the following statement—

"We have found it necessary to lay up a certain number of our vessels, but these to a great extent have been such as were temporarily unseaworthy and which we could very easily spare. We could rehabilitate them in short order. We are experimenting now with Diesel oil-engines and these will be used in greater number all the time and will be of estimable economic benefit to our merchant marine."

THE BALTIMORE 1,000 H.P. MARINE OIL-ENGINE.

In the table of high-powered Diesel-type engines published in our last issue, no reference was made to the experimental mechanical-injection type of reversible marine oil-engine recently completed under Wygodsky patents by the Baltimore Oil Engine Company. This engine operates on the two-stroke opposed-piston cycle, developing 1,000 shaft h.p. at 400 r.p.m. and is a radical departure from any other engine yet completed. It is of the valveless double V-type with sixteen cylinders and pistons 10 in. by 10 in., but has only eight combustion chambers. Scavenging is by means of ports, leaving the combustion-chambers free of all valves and valve-mechanism, there being only one orifice for the solid-injection fuel-sprays. This engine was laid-down during the war for submarine propulsion from designs by Leon Wygodsky and is now being developed for Diesel electric-drive for merchant-ship propulsion. It is of very light weight, weighing only 35,000 lbs. or 35 lbs. per brake horse-power. We recently saw the engine running and later on full details and illustrations will be given in "Motorship." We were advised by Mr. A. W. Gieske, Munsey Bldg., Baltimore, who has financed the development of this unique engine, that he will be glad to have shipbuilders, shipowners and enginebuilders inspect the engine at their plant at any time mutually convenient.

MERCHANT SHIPYARD TO ENTER GENERAL ENGINEERING FIELD

To Specialize in Ship Power Conversion and Repairs, including Diesel-Electric Drive

The Merchant Shipbuilding Corporation, which operates a modern fifty-acres plant at Chester, has decided to immediately branch-out in general engineering lines, embracing steel construction in general, manufacturing, power plant equipment, machinery, railroad equipment and plate shop-work. This will be in addition to the general shipbuilding business now conducted, including ship conversion and repair work. The yard is adequately equipped for extensive work along these lines, especially in shipbuilding and kindred work. Ships up to 15,000 D.W.T. capacity are now being built. Every facility is available for the conversion of previously-built steamships to Diesel motorships, Diesel-electric driven or geared-turbine drive.

It is also stated by the Company's publicity-department that this Corporation wil be one of the few in America to be licensed to build Diesel-engines. This branch alone will give employment to hundreds of additional men in the Chester Yard. These new lines were recently decided upon by the Directors of the Merchant Shipbuilding Corporation.

However, judging from a conversation with an official we are inclined to think that the Merchants Shipbuilding Co., is more likely to enter into an arrangement with some leading Diesel-engine manufacturer to supply engines for vessels that they expect to convert, rather than undertake the building of engines themselves.

"GROTIUS" A SMALL DUTCH MOTORSHIP

There has been launched in Holland to the order of De Roode Ster of Rotterdam, the 68 ft. Skandia oil-engined motor-vessel "Grotius."

MOTOR LIFEBOATS FOR WHITE STAR LINERS.

A number of motor lifeboats for White Star liners are under construction at the Bootle Plant of Harland & Wolff. They are 32 ft. and 28 ft. craft to be equipped with 20 b.h.p. Gardner kerosene-engines.

NEW MEXICAN AUXILIARY

In a wooden hull purchased by Manuel-Angel Fernandez, of Vera Cruz, from Christopher Hannevig of New York, a 250 b.h.p. surface-ignition Skandia oil-engine will be installed. The vessel is named "Jayo." Reference to this vessel have previously been made in "Motorship."

TEST OF ENTERPRISE SOLID-INJECTION MARINE ENGINE.

Recently a 30 days' test was made of a 100 h.p. Enterprise marine Diesel-engine of the mechanical-injection type, which was recently described and illustrated in "Motorship." The oil used in this test was of 40 degrees gravity.

NEW ZEALAND COASTWISE MOTOR SCHOONER

On the schooner "Huia" owned by Mr. Leo Walsh, Auckland, New Zealand, a 160 B.H.P. Beardmore surface-ignition oi-engine is being installed. Three 80 B.H.P. twin-screw Beardmore oil-engine sets are also being fitted in other wooden schooners owned by Mr. Walsh in addition to one 60 B.H.P. engine in a fifth vessel.

"KIRKETIN" RE-NAMED "WM. DONOVAN"

The Wm. Donovan Lumber Co. of San Francisco have re-named their recently acquired wooden motorship "Kirketin" to "Wm. Donovan." She is propelled by twin 350 b.h.p. Winton Diesel-engines.

THE "LADY CARMICHAEL" RE-NAMED "HOBGOBLIN"

Arthur Tate & Company's iron twin-screw Vickers-Petters engined motorship "Lady Carmichael" has been re-named "Hobgoblin." She is of British registry, and is one of a large fleet of motor-vessels.

AUXILIARY "MABEL STEWART" CHANGES NAME.

Referring to the wooden auxiliary "Mabel Stewart" built in 1917, at Vancouver, and powered with a 320 h. p. Bolinder oil-engine, this vessel is now owned by D. N. Calmeris, of Piraeus, Greece, and recently had her name changed to "Calmeris."

RE-POWERING TUG

In a towing-tug formerly powered with gasoline-engines a Skandia Pacific oil-engine of 100 b.h.p. will be installed. The vessel is owned by N. Fay & Sons of Rio Vista, Cal., and will be used to tow barges from Stockton, Cal., to the San Francisco Bay region.

"KADUSKAK," AN AUXILIARY FOR SALVAGE COMPANY

Last year the Southern Salvage Co., Ltd., of Le Havre, Nova Scotia, took delivery of the wooden auxiliary schooner "Kaduskak," 196 tons gross. She is fitted with a four-cylinder 10½ in. by 12½ in. Fairbanks-Morse surface-ignition oil-engine.

OPERATION OF TANKER "TREFOIL"

In a recent statement to the Institute of Marine Engineers of London, and following his interesting paper on Solid Fuel-Injection, Mr. C. McTameney said that the Vickers-engined Diesel motor-tanker "Trefoil" from the time she left the builders till she went for a refit, 18 months had expired. During all that time the ship was under one hour's notice to be ready for sea. "I must say," he continued, "it was astonishing how these engines ran so long without having any repairs done—the only part of the engine we had adrift was one of the exhaust-valves spindles which had stuck; as for any other parts nothing had been touched, not even a bearing of any sort, in fact the main Diesel-engines could have carried on another twelve months without a refit."

CONVERSION OF THE "INGVID"

An old Russian three-masted schooner named "Ingvid" is being converted to motor-power by the Exe Transportation Co. of Falmouth, England, and a 240 b.h.p. Tuxham surface-ignition oil-engine is being installed.

INDIAN MOTORSHIP WITH AMERCAN ENGINES

The wooden twin-screw vessel "Binod" 460 tons gross, owned by M.C.B. Sethi of Calcutta, India, has been powered with twin Fairbanks-Morse oil-engines. She was built by Kali Kurmar De Chittagong.

JOHN F. METTEN TO READ DIESEL-ENGINE PAPER

On May 26th, at 8 P.M., John F. Metten and J. C. Shaw will read a paper entitled, "The Internal-combustion Engine as Applied to Marine Propulsion," before the Society of Naval Architects, at Assembly Room No. 1, Engineering Societies Building, 29 West 39th Street, New York City. Messrs. Metten & Shaw are Chief-Engineer and Assistant-Engineer, respectively, of William Cramp & Sons Ship & Engine Co., Philadelphia, Pa.

ANNOUNCEMENT

There has been an unavoidable delay in connection with the publication of the MOTORSHIP YEAR BOOK, but the work is being rushed with all possible speed. Readers who have already ordered copies will receive the first copies to be ready.

MOTORSHIP "SULINA" RUNS TRIALS

"Sulina" is the name of Swedish Orient Line's 4,450 tons d.w.c. single-screw motorship, built by the Oresunds Varvet, Landskrona, Sweden, and Diesel-engines by the Gotaverken. She recently ran her trials and a speed of 9 knots attained. Drawings and a description were given in our issue of January, 1921, page 44.

TRIALS OF MOTOR COASTER "CORBIE HILL"

Trials have lately been run of the British coast-wise 275 tons-gross motor-vessel, "Corbie Hill," built for the Fraserburgh Shipping Co., Fraserburgh, Scotland, by Nobel & Co., of the same city. Twin 75 b.h.p. Gardner surface-ignition oil-engines are installed. Speed 9 knots loaded.

LATEST VOYAGE OF THE MOTOR TANKER "NARRAGANSETT"

As we close for press, the Vickers Diesel-engined motor-tankship is in New York Harbor. By the time this issue is published she will be en route back to England, and by May 14th will have completed one year's service. She then will have covered in excess of 40,000 nautical-miles.

On this trip from London to New York, a distance of 3,235 nautical-miles, she took 12 days, 15 hours, 3 minutes, from Light to Light, averaging 10.75 knots on a total fuel-consumption of 119.4 tons for the main engines, and 33.8 tons for the auxiliary-boiler. Lubricating-oil consumption totalled 169 gallons. The port engine averaged 117.0 r.p.m., and the starboard engine 117.2 r.p.m.

With reference to the auxiliary-boiler's consumption of 33.8 tons it is interesting to learn that the sister motorship, "Seminole," will utilize the exhaust-gases for generating steam to maintain the oil-cargo in a liquid state. This will afford a saving in fuel-consumption, and is very important, particularly as in New York tankers are not allowed to use their own steam, but are obliged to utilize steam from the shore.

Chief-Engineer Rawes advised us that when the "Narragansett" was placed in service none of his engine-room crew had previous experience with Diesel-engines, with the exceptions of the engineer from the works and himself.

MONITOR, NOW MOTOR TANKER

The British motor-monitor No. 18 has been reconstructed and is now a tanker owned by the Anglo-Saxon Petroleum Co. of London, who now own about half-a-dozen similar converted craft. She has been renamed "Annan" and is propelled by twin 320 Bolinder oil-engines and carries about 600 tons deadweight. She operates between Curacao and Venezuela and her speed is 7½ knots. The conversional work was carried out by the Rotterdam Dry Dock. A number of sister motor monitors have been converted to tankers

LECTURE ON DIESEL-ELECTRIC DRIVE

Diesel-electric drive as a type of marine propulsion, considered from both a standpoint of reliability and as an investment to a shipowner, was the basis of a recent lecture before the Marine Engineers' Beneficial Association, by Mr. W. E. Thau, electrical-engineer of marine-propulsion for the Westinghouse Electric & Manufacturing Co., who predicted that many present installations of the older type of propulsion would be replaced very shortly with the Diesel-electric drive, and that as soon as the new shipbuilding program planned by steamship lines was under way this type of drive would predominate on the smaller ships.

CONVERSION OF THE "FIONASHELL"

The old 2,444 tons gross steel sailing-ship "Fionashell" ex-"Fennia" built in 1892 by Workman, Clark has been fitted with twin eight-cylinder 14½ in. by 15 in. Vickers Diesel-engines. She is now owned by the Anglo-Saxon Petroleum Co. of London and is 284 ft. 2 in. long, by 42 ft. 1 in. breadth and 24 ft. 5 in. depth. The "Oweene," also owned by the same firm has been re-named "Ortinashell."

NEW POLAR EXPLORATION VESSEL

Donald B. McMillan's new auxiliary schooner "Bowdoin" was launched on April 9th at Hodgdon Brothers Shipyard, East Boothbay, Maine. She will be used by her owner for North Polar exploration work, and has the following dimensions:

Length	80 ft. 10 in.
Breadth	19 ft. 7 in.
Draught	9 ft. 6 in.
Displacement	115 tons
Power	45 b.h.p.

For auxiliary power she is fitted with a Fairbanks-Morse surface-ignition type oil-engine.

OPERATION OF THE "BORGLAND"

"Borgland," Fred Olsen's 750 tons d.w.c. 2,000 i.h.p. cargo-motorship, described in our issue of February, 1919, has run 95,000 nautical-miles without an involuntary stop at sea. She is propelled by Akers-Burmeister & Wain Diesel engines turning at 150 r.p.m. and driving twin 10 ft. 4 in. dia. by 8 ft. 3 in. pitch propeller. She averages 10 knots loaded on a fuel-consumption of 7 tons per day. With 900 tons of bunker-oil her radius is 120 days at full speed. She has a crew of 32 men, including 11 in the engine-room.

OPERATION OF THE EAST ASIATIC CO.'S BIG FLEET OF MOTORSHIPS

State-Councillor Andersen of the East Asiastic Co., Copenhagen, recently made some interesting statements in a past-war review of the operation of this great trading company, as follows:

"As a result of the experience gained with the motorships the company resolved in the middle of 1915 to adopt exclusive motor service on its routes over the oceans. In this connection the following information may be of interest. The motorship "Selandia," placed in service in 1912, and the motorship "Siam," placed in service in 1913, have up to the middle of 1919 covered distances corresponding respectively to about 16 and 14 times the circumference of the earth at the equator, in practically uninterrupted runs under all sorts of climatic and weather conditions. The experience gained all the time, is turned to account both for the ships already in service, and in the new ones to be built.

"In agreement with the mentioned decision 21 twin-screw motorships of an improved "Siam" type have been ordered during the few last years. Nine of these are of about 10,800 tons, six of about 12,500 tons and six of about 14,500 tons loading capacity, and these together with six later-planned vessels of various size according to the purpose, for which they are destined, comprise in all about 325,000 leading tons.

"The first mentioned 21 motorships that have been ordered from Messrs. Burmeister & Wain, Ltd., should according to the contract have been delivered by and by, the last one in March, 1921. But owing to the influence of the war, especially failing supplies of shipbuilding materials, this new building program has progressed but little. Since 1914 the company has received the following new motorships. In 1915 'Falstria,' 'Australien,' 'Panama' and 'Chile' in 1916, 'Peru' in February, 1919, 'Asia.' The company probably will not receive all the remaining vessels of the program till 1924 at earliest.